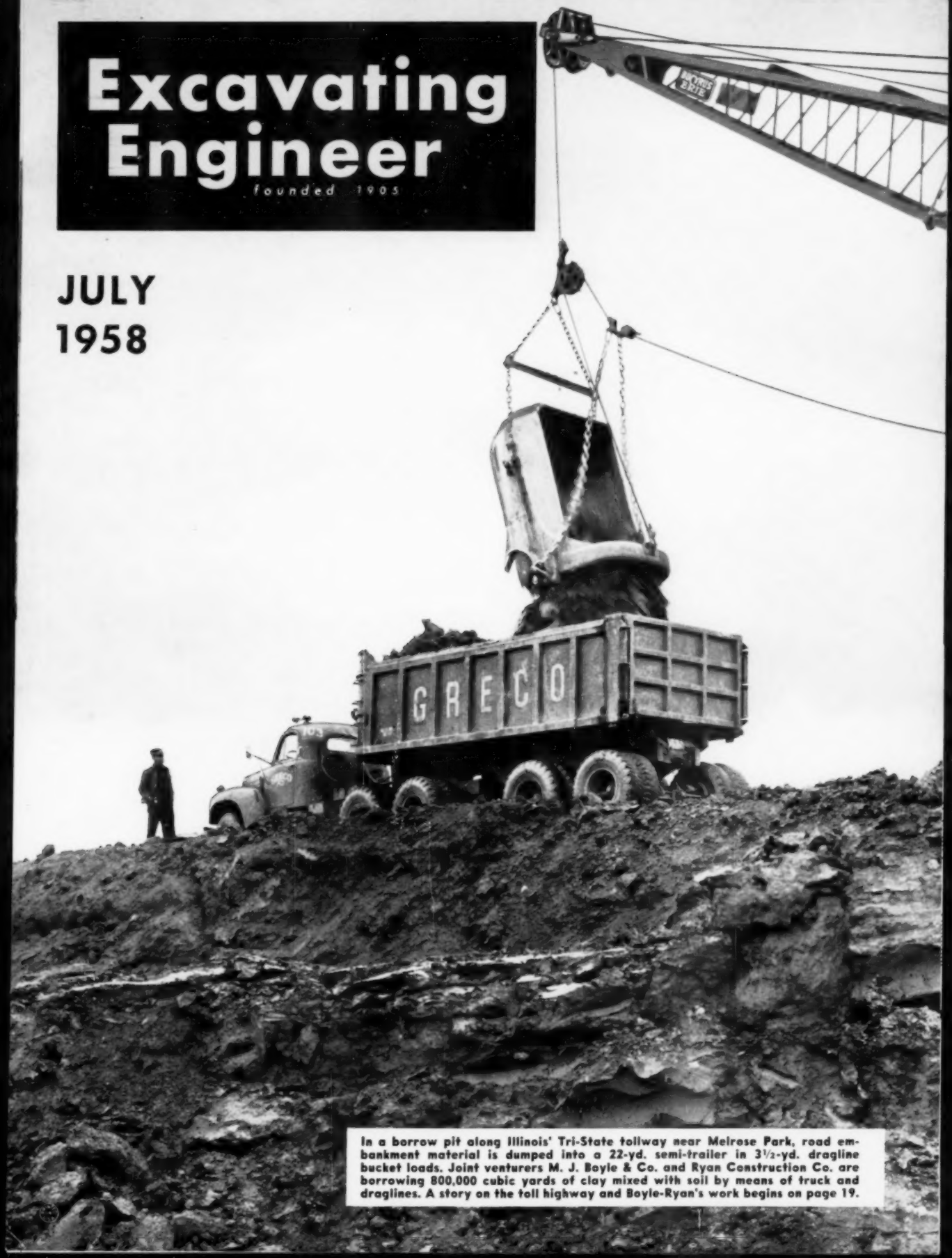
Excavating Engineer

founded 1905

JULY
1958



In a borrow pit along Illinois' Tri-State tollway near Melrose Park, road embankment material is dumped into a 22-yd. semi-trailer in 3½-yd. dragline bucket loads. Joint venturers M. J. Boyle & Co. and Ryan Construction Co. are borrowing 800,000 cubic yards of clay mixed with soil by means of truck and draglines. A story on the toll highway and Boyle-Ryan's work begins on page 19.

CALIFORNIA — Near Culver City this 30-B Transit Crane handles 48-in. ID concrete pipe for a new water line. The 7-mile system is being constructed to carry Colorado River water to Culver City. Work is maintained at a steady clip despite heavy traffic along a route that includes 14 tunnels from 40 to 300 feet in length. Working with the 30-B are a Bucyrus-Erie 22-B equipped with clamshell and Bucyrus-Erie 38-B hoe.

These Contractors Are Using 30-Bs to Turn Jobs into Profits . . . You Can Too!

More and more contractors throughout the country are making money with new Bucyrus-Erie 30-Bs on their jobs. These men profit from the 30-B's air controls for smooth, big output working cycles; easy servicing and automatic lubrication of many parts that provides more working time; large, cool running clutches and brakes that mean constant response to coordinate every machine function.

You, too, can turn jobs into profits with one of these machines, or any other size in ⅜- through 4-yd. range. Ask your local Bucyrus-Erie distributor for details.

450E58C

BUCYRUS ERIE

A Familiar Sign at Scenes of Progress

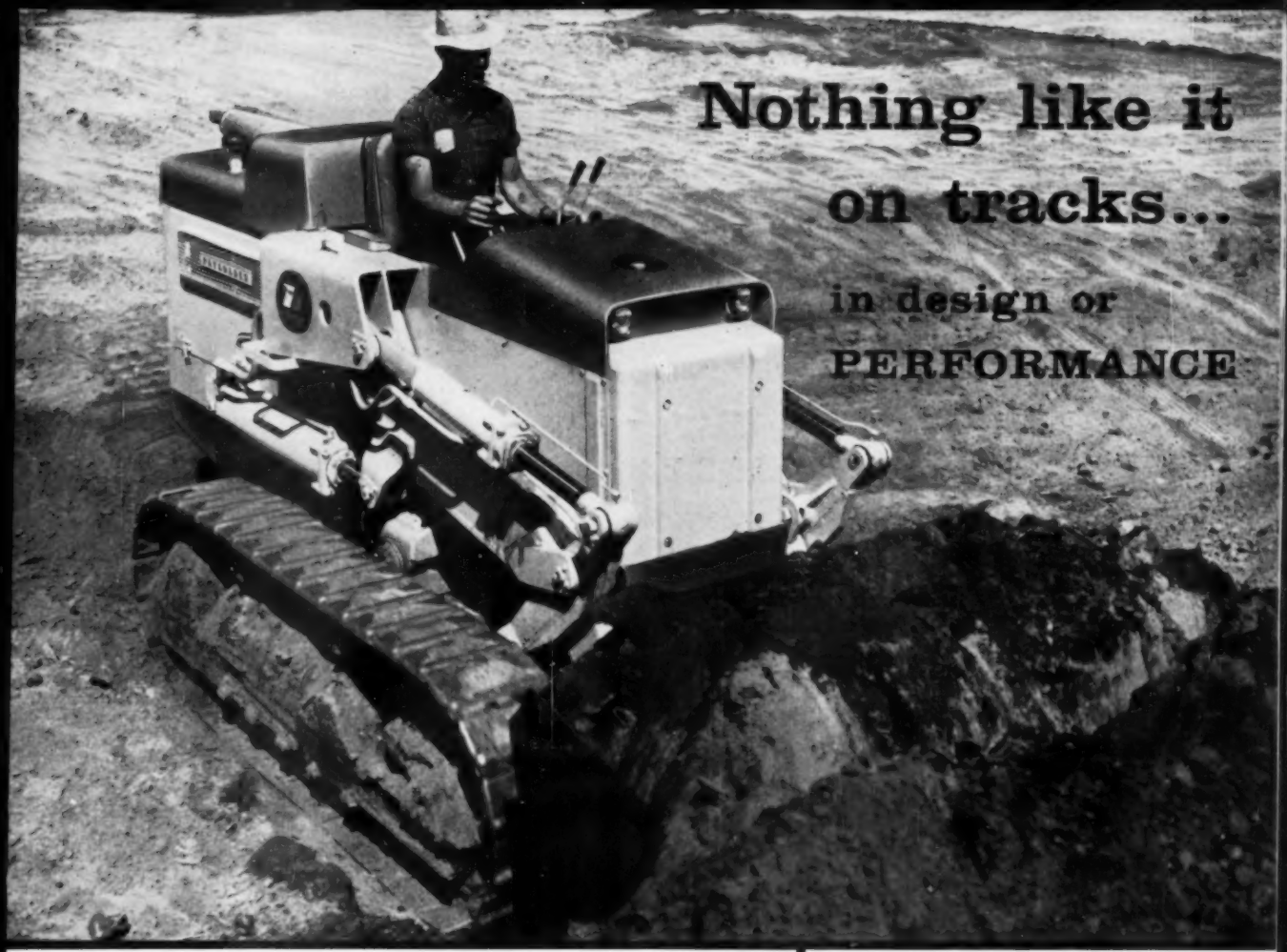
BUCYRUS-ERIE COMPANY • SOUTH MILWAUKEE, WISCONSIN

VIRGINIA — The owner liked the performance, economy, and dependability of his 22-B shovel so well that he decided to buy this 30-B dragline. He uses the new machine to remove overburden of dirt from a sand and gravel deposit near Annadale, Va. The dragline also loads sand and gravel into trucks for hauling to road and parking lot construction sites.

MINNESOTA — Equipped with 70-ft. boom, this 30-B dragline excavates in the yard of a paper company in Brainerd. This machine removes sand and clay for the installation of new papermaking equipment. The 30-B was also used to set steel on new plant construction.

WASHINGTON — This 30-B hoe does double duty for its owner during installation of a 15,000-ft. water line for the city of Tacoma. After digging a section of 5-ft. deep trench — and without any change of front ends — the 30-B lowers a section of pipe into the excavation. Trenching is through hard pan, rock, and clay. Not shown but working on the same job is a Bucyrus-Erie 38-B hoe.

CONNECTICUT — Teamed up with a Bucyrus-Erie 22-B shovel, this 30-B dragline dredges sand and gravel to create a 7-acre lake for a housing project near Norwalk. This lake, a narrow stream before the project started, has been enlarged by the removal of over 100,000 yards of material. As the 30-B spoils the material, the 22-B loads it to trucks for removal to another location, where it is stockpiled for use on the owner's other contracts.



model 12 PAYLOADER®

Years of Hough development and testing bring you this model 12 "PAYLOADER" that is years ahead of the field. It's the first built-as-a-unit tractor-shovel, completely designed for shovel work instead of a tractor attachment. It outperforms much larger units and is a driver's dream in ease-of-operation, easy riding, visibility and safety.

BALANCE Engine-at-rear is the basic difference. It spreads the weight of the machine and load over the entire track lengths instead of concentrating it on the front idlers. Result — more traction for digging, more stability for faster carrying, smoother riding, less track maintenance . . . PLUS the ability to work in soft spots where others would bog down.

SPEED Power-shift transmission and power-steer permit instant on-the-go shifting and steering that is fast and almost effortless. There's no pulling and pushing, no foot brakes. There is instant response and speeds up to 10 mph forward *and* reverse.

VISIBILITY Driver is comfortably seated up front where he can see what his bucket is doing and where he is going. He is also spared the bouncing action of conventional rear-seated locations.

For tractor-shovel performance and ease of handling like you've never seen before, ask your Hough Distributor about the model 12 "PAYLOADER". Ask him about Hough Purchase and Lease Plans too.

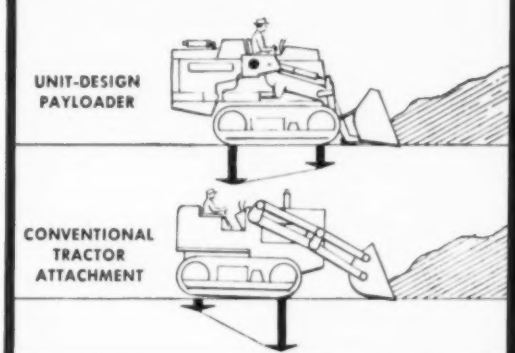
Modern Materials Handling Equipment

THE FRANK G. HOUGH CO.

LIBERTYVILLE, ILLINOIS

SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY

Rear engine mounting distributes weight over entire track length . . . gives you more traction and stability for digging, carrying and dumping.



THE FRANK G. HOUGH CO.
708 Sunnyside Ave., Libertyville, Ill.

Please send more information on the outstanding 1¾ cu. yd. model 12 "PAYLOADER"

Name _____

Title _____

Company _____

Street _____

City _____ State _____

6-C-2

600,000 YARDS TO MOVE IN 30 DAYS...

150,000 MOVED IN FIRST 4 DAYS!

"I didn't believe it, but it's true," says R. D. McDougal, Jr., of McDougal-Hartmann Co., in speaking about the performance of his equipment spread operating in Illinois. "For example, our DW15s made 75 trips each in four hours over an 800-foot haul. They averaged 12-13 pay yards a trip. This machine really has the power and balance to keep it from getting hung up."

Mr. McDougal is talking about the performance of four Caterpillar DW15 (Series E) Tractors with No. 428 LOWBOWL Scrapers, part of his fleet of 22 big yellow machines moving sandy clay for a factory site. The machines, including D9 and D8 Tractors, No. 12 Motor Graders and other Cat wheel Tractor-Scrapers, kept going 10 hours a day. In four days 150,000 cu. yd. of earth were moved, one-fourth of a project that was expected to take 30 days!

The Cat DW15 packs 200 HP (maximum output), clocks 37.2 MPH, delivers a maximum rimpull of 27,500 lb. It's fast, maneuverable, tough. Works well with the No. 428 LOWBOWL Scraper (13 cu. yd. struck, 18 heaped), or with the Athey PR15 Rear Dump Trailer (14.1 cu. yd. struck, 22-ton capacity). But if you're like Mr. McDougal, you have to see it to believe it. So call your Caterpillar Dealer. See this fast yellow team in action . . . *right on your own job.*

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR

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HEAVY-DUTY EQUIPMENT
...QUALITY SERVICE...
PARTS YOU CAN TRUST

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Excavating Engineer

South Milwaukee, Wisconsin

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Teeth that really dig!

WHEN ORDERING
NEW EQUIPMENT

MAKES GOOD EQUIPMENT
DIG BETTER–LAST LONGER

H&L TOOTH COMPANY

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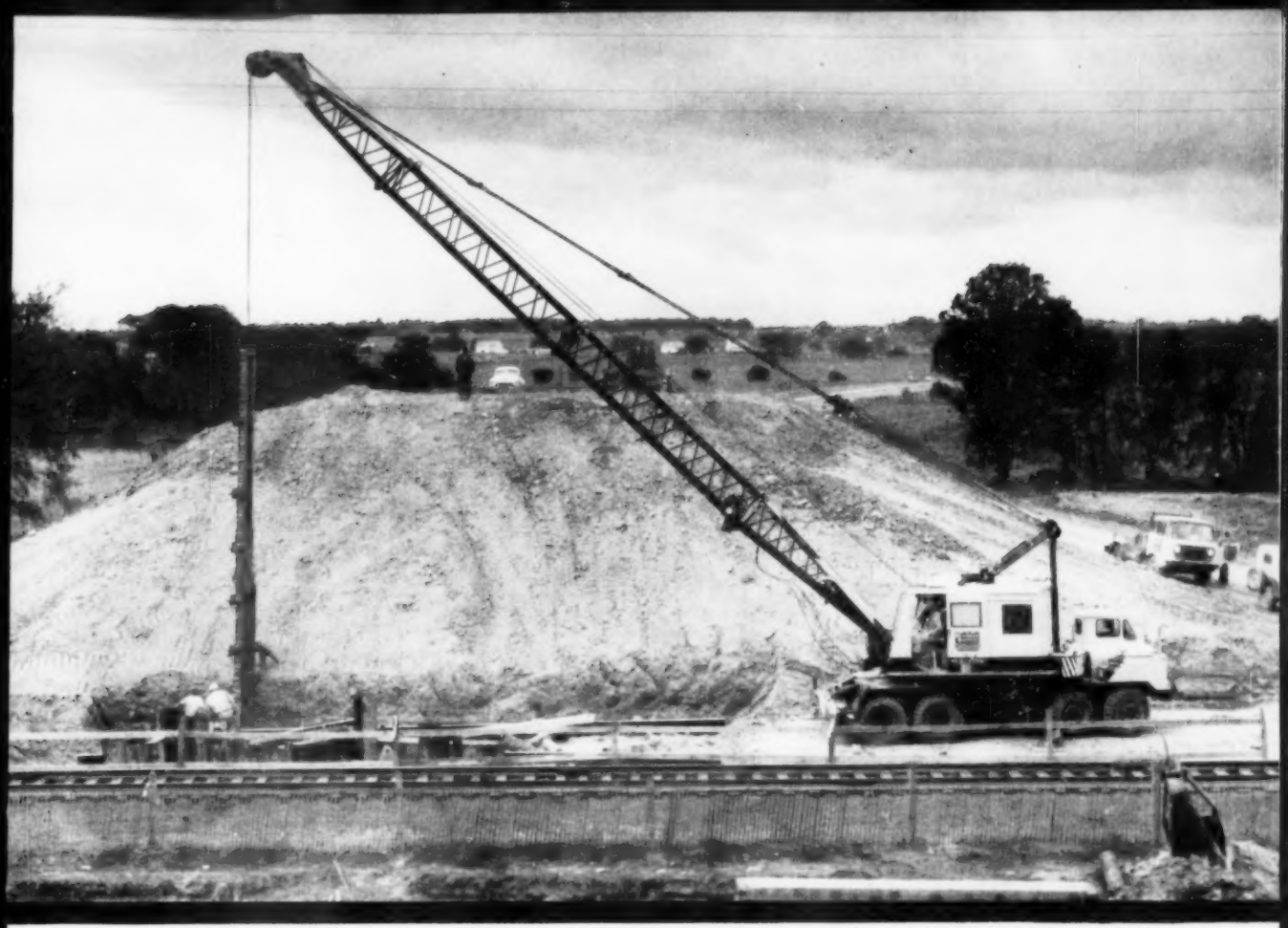


40-TON GRADE SEPARATOR

Pile driver service is only one side of the busy life of this Marion 43-M Truck Crane. Here it uses a 70-foot boom and 40-ton muscles to pin down an Ohio grade separation footer. Any operator looks better than ever with a 43-M torque converter, Marionair Control and a foot accelerator working for him and with him. Loads, light or heavy, move slowly or quickly, at will, and spotting and holding the load comes easy. Your Marion Distributor has big news for you about fast, economical multi-service truck, wagon and crawler cranes.

You get **MORE** *with* **MARION**

TODAY'S MARIONS GIVE YOU MORE IN SUSTAINED, LOW-COST PERFORMANCE

MACHINE	Shovel Capacity	AVAILABLE AS			
		Hoe	Crawler Crane	Truck Crane	Special Crane
35-M	¾	Yes	Yes	Yes	—
43-M	1	Yes	Yes	Yes	—
362	1½	Yes	Yes	—	Yes
93-M	2½	Yes	Yes	—	Yes
101-M	3	—	Yes	—	—
111-M	4	—	Yes	—	—

MARION POWER SHOVEL CO. • MARION, OHIO

A Division of Universal Marion Corporation

Send me information about MARION ..... yard shovels, ... yard hoes and ..... ton cranes (☐ crawler mounted ☐ truck mounted).

☐ Have a salesman call.

Name ..... Title .....

Company .....

Street .....

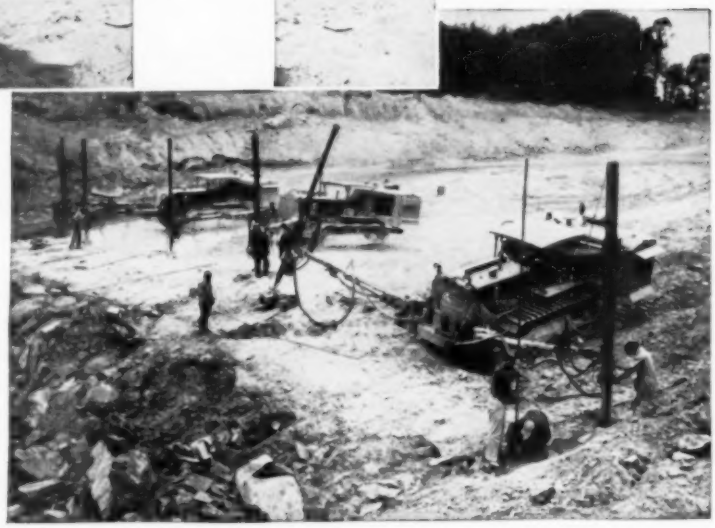
City ..... Zone ..... State .....

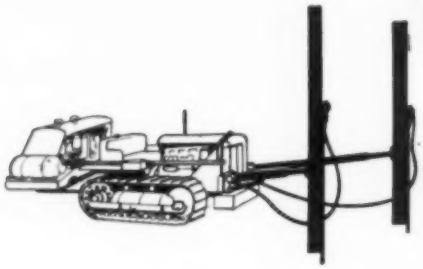
HYDRA-BOOM DRILLS

TRACTOR OR TRUCK

GYRO-FLO COMPRESSOR

put them together and you have a time-saving labor-saving





Hydra-Boom

DRILLING RIG

Here's a rugged, self-powered and self-propelled drilling rig that will increase production, cut drilling costs and convert setup time into *drilling time* on any rock excavation job.

With two I-R Hydra-Boom mounted X71-WD Drifters, you can spot holes on a dime and set up to drill in *any position* at the touch of a throttle. Hydra-Booms lift, tilt, extend, retract, dump and swing by smooth, hydraulic power. Operators spend time *drilling rock* — not lugging heavy equipment over rough ground. On job after job, Hydra-Boom Drilling Rigs have doubled production per shift and cut total cost per foot of hole by 50% or more.

Hydra-Booms are big and rugged, with larger, more powerful cylinders that work at lower pressure, hold better, eliminate creeping and require less maintenance. Safety-lock check valves prevent booms from creeping or dropping.

The 600 cfm Gyro-Flo rotary compressor provides ample air power to run both drills simultaneously at top efficiency. And because it has no pistons, rings, valves, rods or clutch, it requires far less attention and maintenance than other types of portable compressors. With the air power plant right on the same rig, hose connections are short and always out of the way, eliminating air hose breaks due to freezing, blasting or collisions.

For the complete Hydra-Boom story, see your nearest I-R representative, or write to Ingersoll-Rand for a copy of new Bulletin No. 4196

Ingersoll-Rand

5-846 11 Broadway, New York 4, N.Y.

A CONSTANT STANDARD OF QUALITY IN EVERYTHING YOU NEED FOR DRILLING ROCK

In secondary blasting, it's easier to connect and ignite all safety fuse with Quarrycord

Prime with safety fuse and blasting caps. You'll play-it-safe two ways:

- No danger from stray electrical currents or thunderstorms.
- No big "boom!": you get a series of small shots: "pop-pop-pop".

Connect and ignite your safety fuse primers with Quarrycord and play-it-safe *again* because—

- No men on the rock pile. The entire blast is set off by *one* man at a point where escape is safe and easy.

Quarrycord is packed on spools in 100-ft. lengths. It is easily lighted with a match and burns with a very hot open flame at the rate of about one foot per second.

HOW TO USE QUARRYCORD

Cut your safety fuse in equal lengths as prescribed by your State law, and prepare your primer cartridges. On the end of the fuse opposite the blasting cap place a Connector. This is a metal tube containing an ignition compound in the slotted end, and color-banded for easy identification. Load and tamp the holes.

When ready to blast, connect all holes with Quarrycord, placing it in the slot of each Connector and pressing the "lid" down to hold the Quarrycord firmly in place and assist ignition.

Connect your main lines with cross lines wherever these will cut down the over-all burning time. Lead main lines off to a point away from the rock pile. When all is ready, light this end with a match and go to a place of safety. Q-4

It's quite a story, told completely in this folder which we'll send you, free, when you ask for it. Write today.

Your explosives supplier can supply Quarrycord and Connectors.

THE ENSIGN-BICKFORD COMPANY

Simsbury, Connecticut • Since 1836

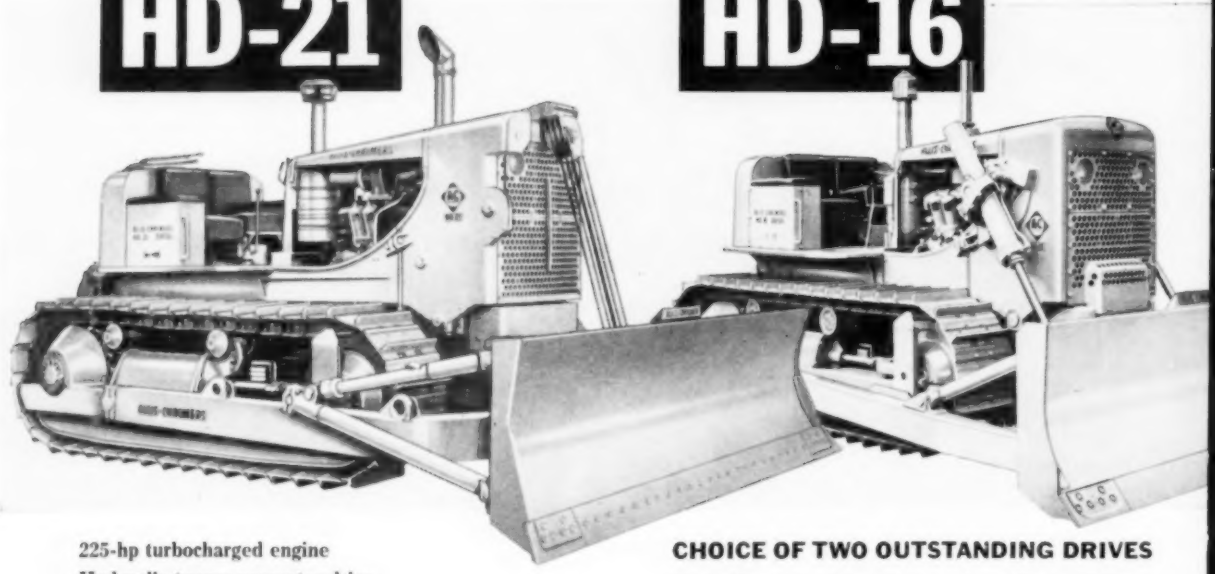
Primacord® and Detacord® Detonating Fuse, Safety Fuse, Ignitacord®, Quarrycord®, Pyrotechnical Devices and Blasting Accessories

ALLIS-CHALMERS CRAWLER TRACTORS . . .

first choice on more and

ALLIS-CHALMERS HD-21

ALLIS-CHALMERS HD-16



225-hp turbocharged engine
Hydraulic torque converter drive
56,260 lb (approx. as shown)

The new HD-21 brings you live power for today's big-tractor jobs—and torque converter drive puts it to work automatically. The HD-21 offers more work capacity—dollar for dollar—than any other big crawler tractor you can buy.
HD-21A illustrated – Two other models available

CHOICE OF TWO OUTSTANDING DRIVES

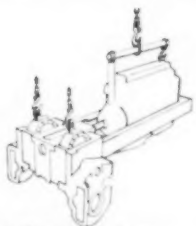
Hydraulic torque converter	All-gear drive
150 net engine hp	141 belt hp
39,090 lb (approx. as shown)	125 drawbar hp

Get up on the HD-16 yourself—and see how it handles jobs ordinarily assigned only to bigger, more expensive crawler tractors. You'll sell yourself—just as more keen-eyed construction men do every day.
HD-16DC illustrated – Five other models available

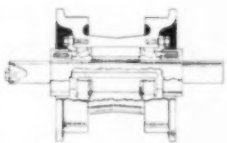
Pioneered and proved by Allis-Chalmers Engineering in Action

THE ONLY COMPLETE LINE OF CRAWLER TRACTORS

Torque Converter Drive gets more work done—automatically provides the right pull or push for every load, at maximum speed for existing conditions. *(Available in HD-21 and HD-16 only.)*



Unit Construction saves valuable time . . . lets you remove any major assembly without disturbing adjacent assemblies.

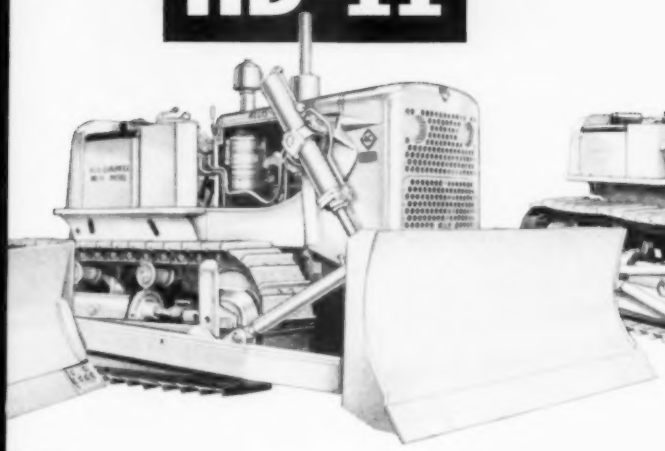


1,000-Hour Lubrication intervals for truck wheels, idlers, support rollers . . . changes daily greasing time into production time.

Look ahead...*move ahead*...and stay ahead

more tough jobs

ALLIS-CHALMERS HD-11



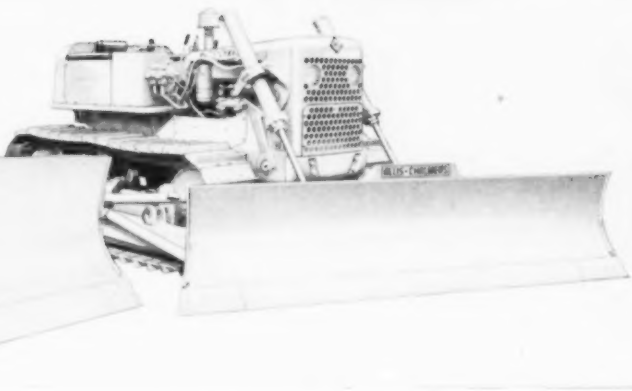
94 belt hp

25,960 lb (approx. as shown)

The HD-11 is setting new standards in its size range . . . offers you dozens of work-boosting advantages, including the industry's easiest shift pattern. A single shift takes it from any forward speed to any reverse—gets short-cycle jobs done faster, easier.

HD-11B illustrated – Two other models available

ALLIS-CHALMERS HD-6



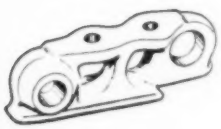
63 belt hp

16,470 lb (approx. as shown)

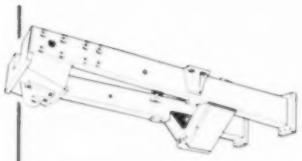
Here's up to 15,500 lb drawbar pull. The HD-6 is the only tractor near its size with big-tractor design advantages—for example, All-Steel Box-A main frame and engine-mounted dozer with direct-lift cylinders for improved weight distribution, accurate dozing and long life.

HD-6E illustrated – Three other models available

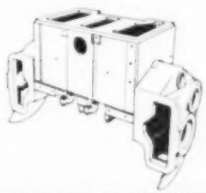
THAT GIVES YOU ALL THESE ADVANTAGES IN EVERY SIZE



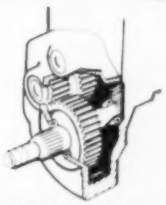
True-Dimension Track heat-treated and machined in the industry's most modern facilities, is setting new track-life records on every type of work.



All-Steel Box-A Main Frame soaks up shock and strain . . . provides improved weight distribution and equipment mounting.



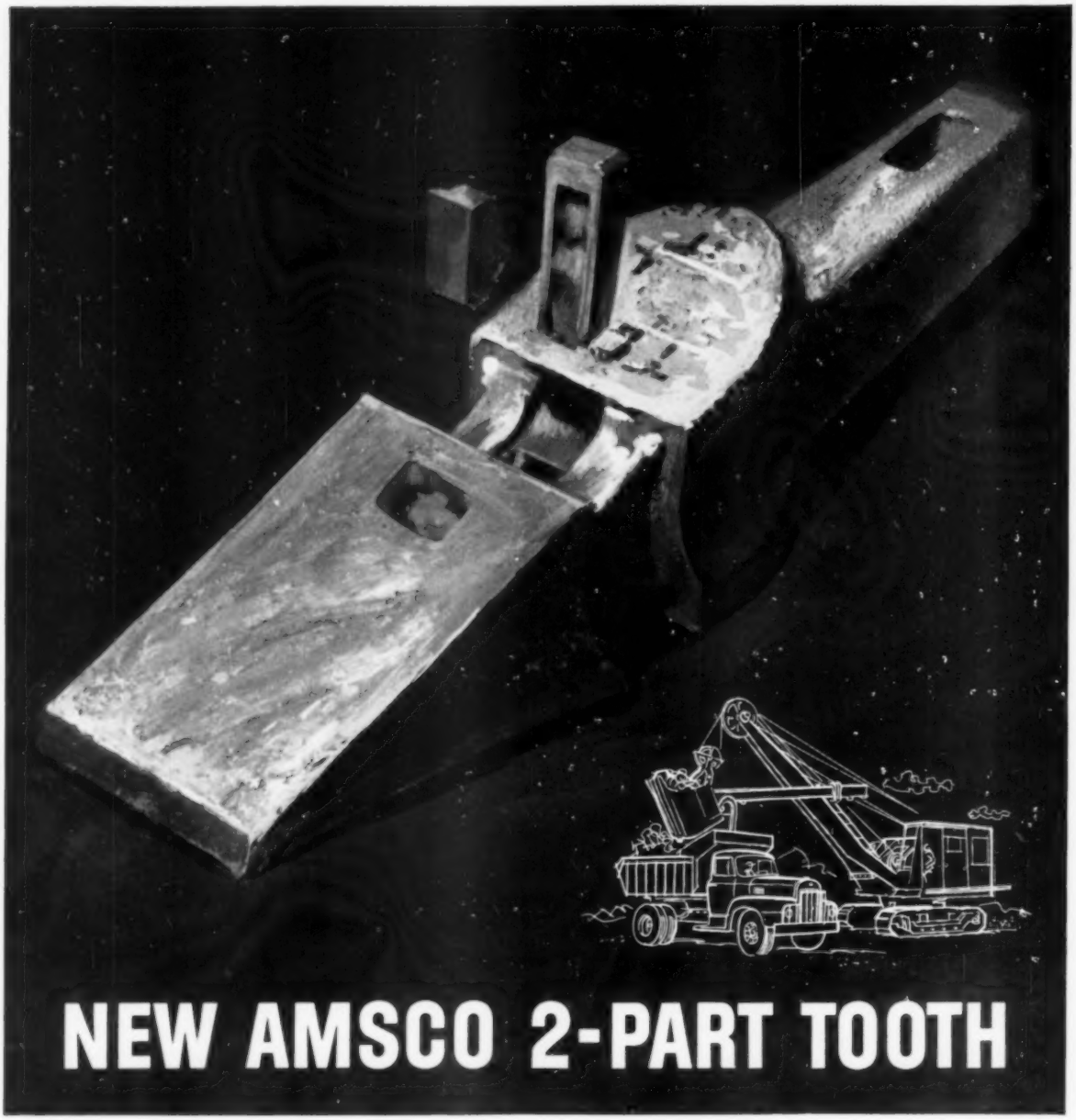
One-Piece Steering Clutch and Final Drive Housing with extreme rigidity and strength . . . line-bored to provide precise alignment of gears and shafts.



Straddle Mounting of All Final Drive Gears with tapered roller bearings on both sides of short, large-diameter shafts . . . provides extra gear life.

ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION, MILWAUKEE 1, WISCONSIN

with ALLIS-CHALMERS



NEW AMSCO 2-PART TOOTH

Special-alloy reversible tips *(easy to reverse)* nearly double tooth digging life...

In quarry work, in cold and hot slag pits... in the roughest of digging tests, these new Amsco® 2-part Simplex teeth have outlasted competitive 2-part teeth more than 2 to 1... at a big saving in tip and adapter replacement time.

You get this longer wearing quality because of the special, rugged alloy used for both tip and adapter. Reversing tips extends digging life even more, yet takes only a few minutes.

Adapters outlast several sets of tips, are equally easy to replace. Pin lock between tip and adapter seats and locks so securely, metal-to-metal, that even side blows can't jar it loose.

We'll be glad to send you a booklet containing reports by Simplex users and describing this new Amsco tooth completely. Write for it today.

AMERICAN Brake Shoe COMPANY

AMSCO

American Manganese Steel Division · Chicago Heights, Illinois

PAYHAULER FLEET

whips 17% grade with bonus loads

The Caldwell Engineers' five-unit 65 Payhauler® fleet highballs 2,500 cu yd of shot rock 1,000 feet daily up a haul road with 17% average grade. That's how this subcontractor keeps on schedule! His contract calls for excavating and crushing 165,000 tons of rock on the $13,000,000 hydro and flood control Oliver Dam under construction at Columbus, Ga.

Making the 17% grade with bonus loads is routine for the Payhauler fleet on this newest of all dams being built by the Georgia Power Co. at Columbus.

"These are crooked haul roads," reports excavation foreman Dudley Rabb, "but our Payhauler fleet is whipping them to keep us on schedule. The rigs haul through axle-deep water 50% of the time...make pull-outs up roads that rise 170 feet in 1,000 feet...yet speed bonus loads to crusher and stockpile."

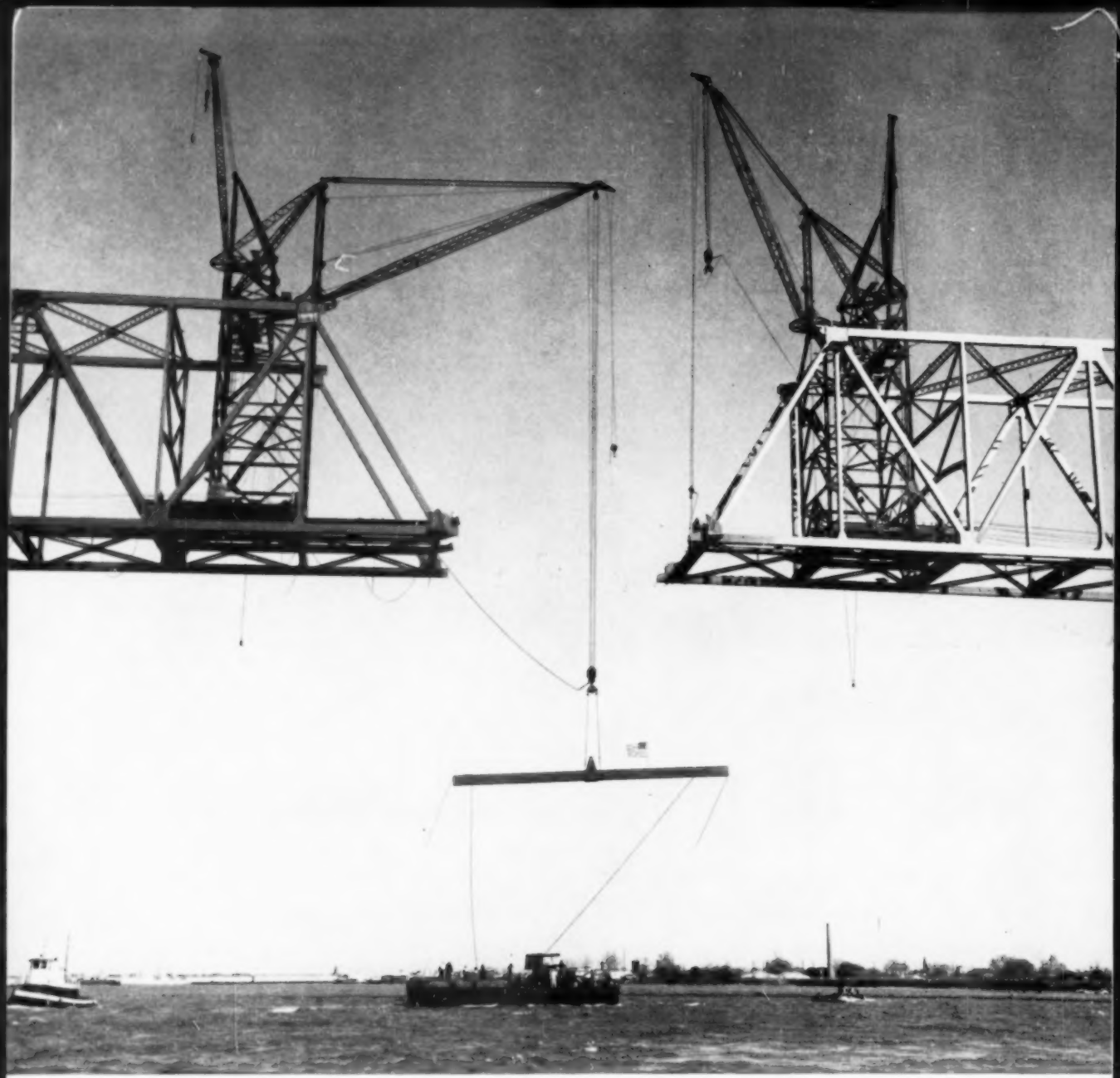
Prove the get-away surge, and up to 25% faster haul speed of an International Payhauler—the result of bonus turbo-charged diesel power; road-matched and load-matched gear choice; and the power-cushioning leverage of planetary drive axles.

See how a Payhauler shortens the cycle with pick-up truck spotting ease. Discover how exclusive high reverse, zip-around power steering, and grade-beating power boost your profits. Try split-second dumping with the double-acting hydraulic hoist. Measure the advantage of Payhauler operating ease, and downgrade safety of positive Torqmatic braking! See your International Equipment Distributor for a demonstration!

International® Construction Equipment

International Harvester Co., 180 North Michigan Ave., Chicago 1, Ill.

A COMPLETE POWER PACKAGE: Crawler and Wheel Tractors . . . Self-Propelled Scrapers . . . Crawler and Rubber-Tired Loaders . . . Off-Highway Haulers . . . Diesel and Carbureted Engines . . . Motor Trucks . . . Farm Tractors and Equipment.



Nation's Longest Cantilever Span at New Orleans. It's said that a downtown bridge across Ol' Man River has been a cherished dream in New Orleans for more than a century. Now they have their bridge, a tremendous structure that links the City of New Orleans with Algiers, on the opposite bank of the Mississippi. Its center span is the longest and perhaps the most spectacular cantilever span in the country.

The picture shown here was taken early in 1958, when the history-making bridge was nearing completion. Scenes like this—with steel rope lifting and maneuvering heavy structural members—were part of the daily drama. Thousands of feet of husky Purple Strand, Bethlehem's finest wire rope, were used to speed the construction work, which at times required lifts of 90 tons or more.

Bethlehem Steel Company, Bethlehem, Pa. On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

Mill depots and distributors from coast to coast stock Bethlehem rope for the following industries and numerous others:

CONSTRUCTION • EXCAVATING • MINING • QUARRYING • PETROLEUM • LOGGING • MANUFACTURING

From TEXAS to CONNECTICUT . . .

Repeat owners get steady pit output from Bucyrus-Erie shovels . . . You Can, Too

These experienced quarry operators prove their satisfaction in Bucyrus-Eries with repeat purchases. They buy another on the strength of past performances of quality-built Bucyrus-Eries already setting new output standards in their pits.

Look over these on-the-job illustrations and check the comments. Then investigate WHY a Bucyrus-Erie shovel provides more working time each hour of every shift . . . more daily output. Your nearby Bucyrus-Erie distributor will gladly help you select the right size machine for your pit — capacities range from ⅜ to 4 cubic yards.

479E58C

BUCYRUS ERIE

A Familiar Sign at Scenes of Progress

BUCYRUS-ERIE COMPANY • SOUTH MILWAUKEE, WISCONSIN

"Obviously, we're satisfied," states the superintendent for New Haven Rock Co., New Haven, Conn. "The 71-B was bought on the basis of performances of our 38-B and 54-B." The 3-yd. shovel works in the Reeds Gap quarry near Wallingford, loading blasted rock for hauling to the crusher plant.

"We bought our third Bucyrus-Erie 22-B on the basis of the past performance of our five-year old 22-B," says K. R. Farquhar, quarry owner, Clinton, Iowa. "That's proof enough of our satisfaction." Farquhar shifts his three ¾-yd. shovels from pit to pit, as needed, in a widely scattered operation. Here, two machines are loading limestone in the Clinton pit.

"Satisfactory in every respect" is the report from Simpson Stone Co., Clarksville, Tenn., on their 1½-yd. Bucyrus-Erie 38-B. It loads granite-like limestone, including frequent removal of large boulders. A ¾-yd. 22-B is also used in this Clarksville pit.

"We bought the 71-B after such good operation of our 54-B and five other Bucyrus-Erie machines," comments C. R. Roth, plant engineer, Servtex Materials Co., New Braunfels, Texas. "We had the 54-B for seven years in rough work with very little trouble." The 3-yd. 71-B works in the quarry loading trucks with stone for the crusher.

Before you bid that next job . . .

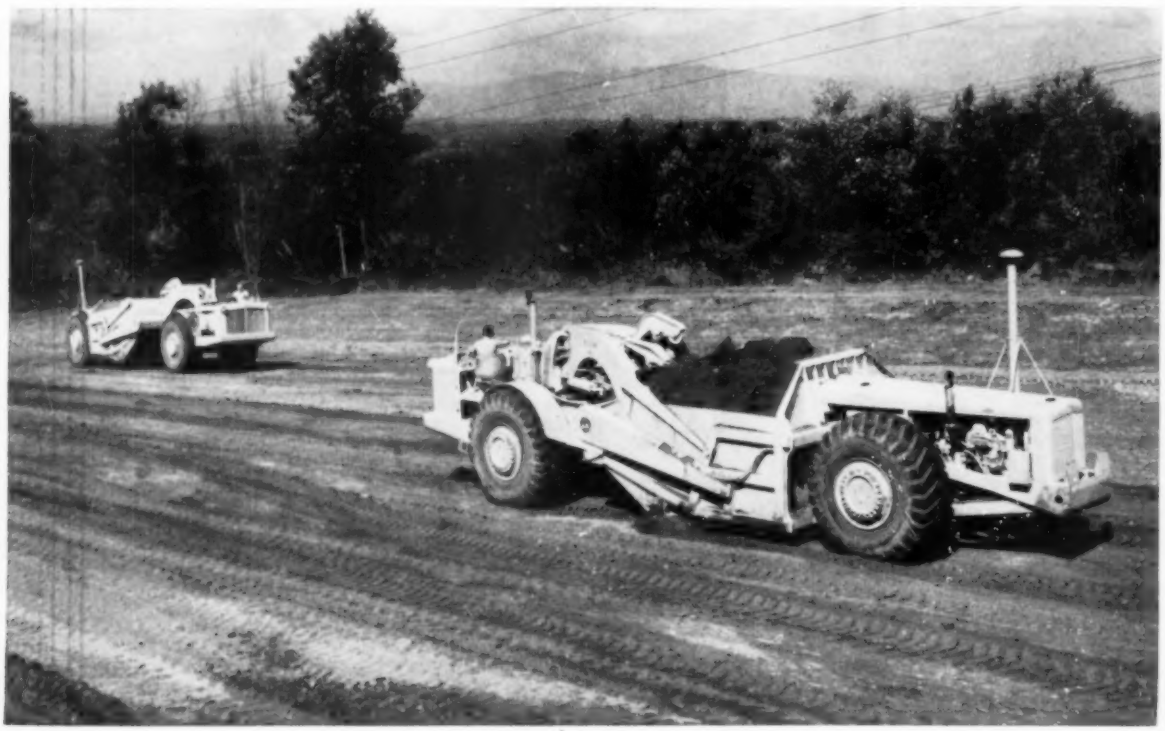
compare the earning power of "Twins"

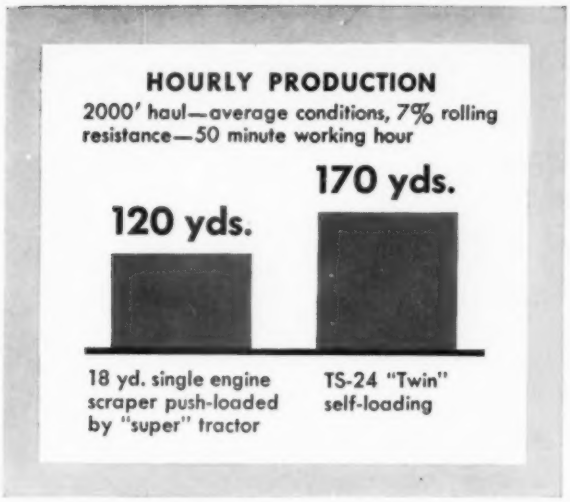
Unless your equipment can help you increase production — without a corresponding increase in costs — you may have a problem instead of a profit on your next job.

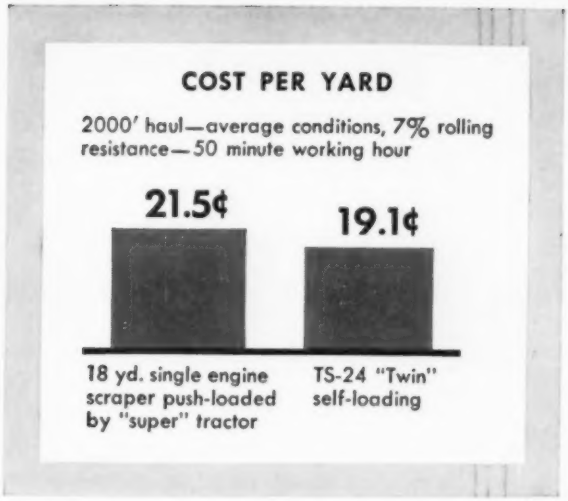
There's one sure-fire way to increase productivity — use the latest methods and the most efficient equipment available for the job, even if it means replacement or addition to your fleet. To stay competitive and still get your share of work — at a price that brings a profit — you simply can't afford to pass up the higher return on investment with new techniques and machines. Here's a typical comparison . . .

On an investment of $255,000 . . . 38% gross return

Suppose you have a spread of three 18 yd. single engine scrapers working on a 2,000′ haul. They're push loaded by a 300 h.p. "super" tractor and you're also using a motorgrader and 200 h.p. dozer and roller. Conditions are average (7% rolling resistance) so your scrapers produce about 360 yds. per hour. Total investment for the entire spread would be about $255,000 — an hourly cost of $77.30. That figures out to 21.5c a yd. Assuming a work season of 2,000 hours, you'd have a total production of 720,000 yds. At an average bid price of 35c a yd., gross revenue would amount to $252,000 and your dirt moving cost would total $154,800. The return is 38% on the equipment investment.

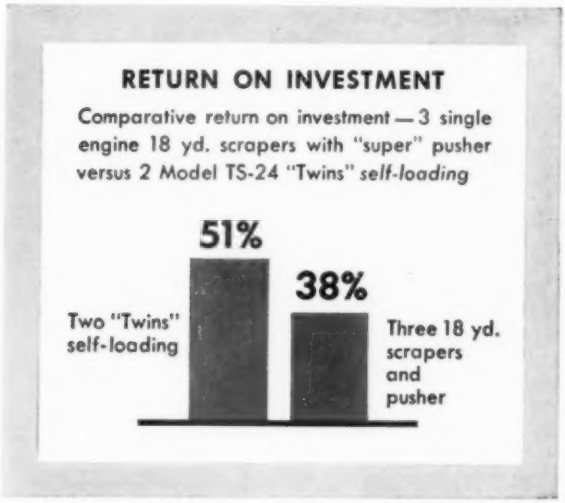



HOURLY PRODUCTION
2000' haul—average conditions, 7% rolling resistance—50 minute working hour
120 yds.
170 yds.
18 yd. single engine scraper push-loaded by "super" tractor
TS-24 "Twin" self-loading


COST PER YARD
2000' haul—average conditions, 7% rolling resistance—50 minute working hour
21.5¢
19.1¢
18 yd. single engine scraper push-loaded by "super" tractor
TS-24 "Twin" self-loading

16% *lower* investment . . . 33% *higher* return

Now, let's say you put two Euclid TS-24 "Twin" Scrapers on the same job and use the same grader and dozer. With the "Twins" self-loading in the average condition, a reasonable estimate of production would be a total of 340 yds. an hour. Total investment, with dozer, roller and grader, would be $214,000. Hourly cost of the complete spread would be $65.00, with a cost per yard of 19.1c. Season production of 680,000 yds. would produce gross income of $238,000 at 35c a yard. Your dirt cost of $129,880 would result in a 51% return on the equipment investment.


RETURN ON INVESTMENT
Comparative return on investment — 3 single engine 18 yd. scrapers with "super" pusher versus 2 Model TS-24 "Twins" self-loading
51%
38%
Two "Twins" self-loading
Three 18 yd. scrapers and pusher

The figures in the above comparison may not jibe with your cost figures but they're down-to-earth estimates of the built-in productivity of the "Twin". Based on your own experience, use production and cost figures that you're sure of and you'll find that Euclid "Twins" will give a tremendous bidding and profit advantage on any size and kind of job.

And don't overlook the bonus performance of the TS-24 that doesn't show in specs or calculations. For example, it's self-loading and independent of other equipment for pioneering work and small yardage jobs . . . it has all wheel drive that enables it to work earlier and later in the season, under conditions that keep other scrapers sidelined. And when you're really pressed for time and yardage, you can add a pusher tractor to get almost unbelievable hourly production.

With "Twins" in your fleet you can bid more work, more profitably and realize the highest return on investment. For facts and figures proof, and a demonstration on your job, see or call your Euclid dealer.

Engineered to fit the job . . .
Euclids are your best investment

GM GENERAL MOTORS EUCLID

EUCLID DIVISION
General Motors Corporation
Cleveland 17, Ohio

UNSURPASSED...
for loading operations
HENDRIX DRAGLINE BUCKETS
"A Type for Every Digging Purpose"...
¼ to 40 Cubic Yards-Perforated or Solid
HENDRIX MANUFACTURING COMPANY, Inc.
MANSFIELD, LOUISIANA
Hendrix Lightweight DRAGLINE BUCKETS

100% Longer Life...
"Down-Time" Cut in Half...
WITH New LAY-SET VHS Dragline
—at Memphis Stone & Gravel

• Mr. L. C. Ring, Vice President, Memphis Stone & Gravel Company, Memphis, Tennessee, says: "Our No. 6 Northwest Dragline is used in an open pit on sand and gravel service. We were only getting about 50 hours of service from the best Improved Plow Steel Draglines we could buy. However, since we switched to new LAY-SET VHS we are averaging 102 hours, getting over twice as much service life.

"But the longer wire rope life is only part of the saving we are making with new VHS. By using this new, tougher wire rope, we have been able to cut equipment 'down-time' for wire rope replacement by over 50% —a very significant cost reduction."

New Grade of Steel

Enthusiastic users are reporting similar savings all over the country in the toughest wire rope applications—draglines, shovel hoist ropes, and winchlines. Developed specifically for these tough applications, new VHS (Very High Strength) wire rope is made from a new grade of steel . . . is at least 15% stronger than Improved Plow Steel, the strongest grade formerly available.

This allows you to handle heavier loads with the same diameter of line. It gives you a higher factor of safety . . . provides greater insurance against sudden over-stressing.

Tougher, More Wear-Resistant

In addition to its greater strength, new LAY-SET VHS is tougher. It resists abrasion . . . keeps its shape under pressure . . . can't become "hidebound" or lose its flexibility.

As a result, it lasts longer in the tough applications for which it was developed. And, as Mr. Ring and countless others can testify, this means important savings . . . both from reduced wire rope costs and the reduction of equipment "down-time."

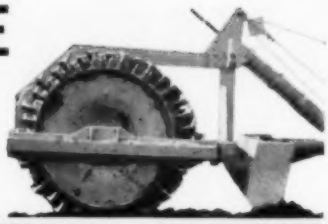
At Your Distributor

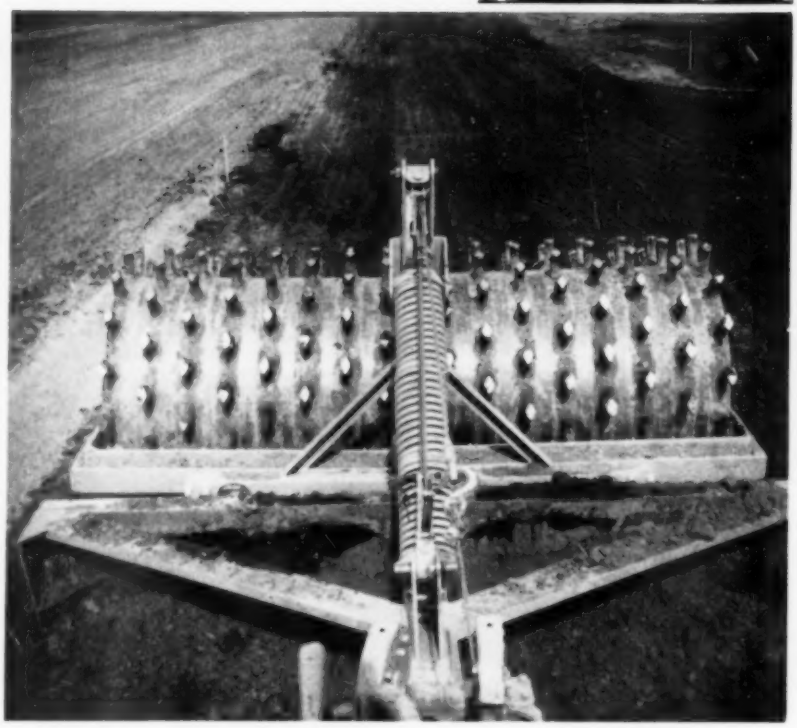
Your nearby Hazard distributor has draglines, shovel hoist ropes and winchlines of new LAY-SET VHS. Call him today for speedy delivery. You don't need any complicated specifications in your order—just tell him the size and diameter you want.

For more information see your Hazard distributor salesman or write to the nearest Hazard office for Bulletin DH-513H

HAZARD WIRE ROPE DIVISION
American Chain & Cable Company, Inc.
Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Bridgeport, Conn.

LAST YEAR HE WOULDN'T OWN ONE –THIS YEAR HE BOUGHT TWO!





The BROS Leveling Tamping Roller* is such an uncomplicated piece of equipment that last year even big grading contractors like Alley Construction Co., of Faribault, Minn. couldn't quite visualize its real value on earthfill work.

But this year, Lloyd Parker, Alley's superintendent on the grading job for nearly a million yards at Wold-Chamberlain Airport in the Twin Cities, put a BROS G2 Roller-Level Blade combination on the job —the results were so good that he purchased a second unit the *very next day!*

You can easily see why: The Leveling Roller makes subgrade rolling a productive item because it produces uniform, proper densities faster than conventional tamping rollers can. The blade puts the materials into the voids, building a smooth, level course, permitting equal compaction pressure over the full width of the drum. Because the course is smooth and compaction is fast, scrapers can haul and spread at faster speeds, earning you greater profits.

The Leveling Blade has 14" vertical adjustment which is controlled from the operator's seat by either hydraulic or cable control. The Leveling Roller is available in rolling capacities from 15,160 lbs. to 44,700 lbs. when roller drum is filled with wet sand.

*Patent Pending

Level Blade Attachments for your present BROS M2 and G2 Series Tamping Rollers are also available. M2 Blade Specifications: 112" width; 24" height; and ½" x 6" double bevel reversible high carbon steel cutting edge. G2 Blade Specifications: 141" width; 31" height; ⅝" x 8" square edge reversible high carbon steel cutting edge.

Get complete information on this new profit-making equipment from your nearest BROS Dealer or write us. World-wide sales and service.

BROS **BROS *Incorporated***
ROAD MACHINERY DIVISION

1057 TENTH AVE. S.E.
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Write today for the full report on the Ohio tests and for complete new literature describing the new BROS SP-730 pneumatic roller. It's free of cost or obligation!

SHEEPSFOOT TAMPERS

ROLL-O-PACTOR

BITUMINOUS CIRCULATOR

VIBRA-PACTOR

9-TON SELF-PROPELLED ROLLER

9 AND 13-TON ROLLERS

Excavating Engineer
founded 1905 JULY 1958

TC-12 dozer pushes a Euc S-18 scraper on Hoyle-Newberg Const. Co. job near Deerfield. Cat DW-21 scraper works in background.

Huge Turnpike Serves Chicago

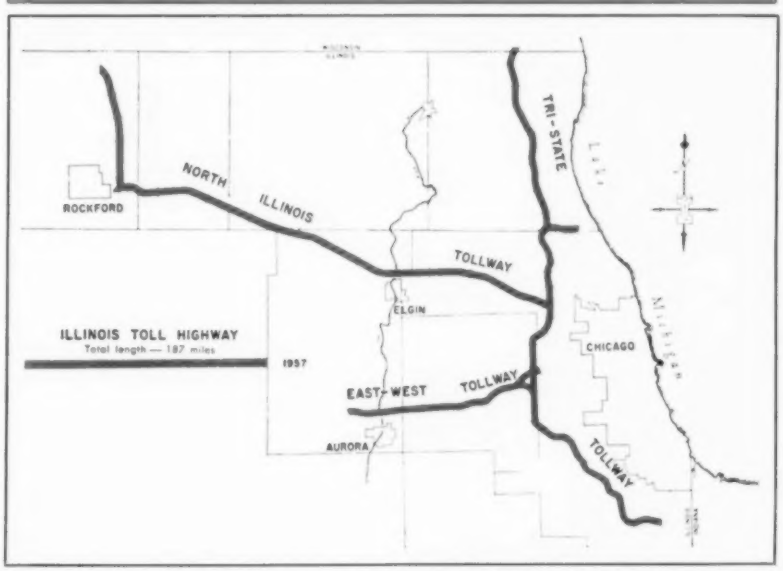
Because of increased federal highway aid, the toll road building boom appears to be halted, at least temporarily. Ultramodern Illinois toll highway provides climax to this construction era.

LAST of the current big toll projects, the Illinois toll highway is rapidly nearing completion. The $441 million, 187-mile long system of superhighways will soon ease traffic problems in the populous northeastern section of the state. All portions of the toll system are expected to be in operation by December 31.

The construction effort is by far the biggest single roadbuilding job in the state's history. The project is especially remarkable because it is being completed within the space of 28 months. Dirt-moving first got under way in late September 1956.

There are several other records which can be claimed by the Illinois State Toll Highway Commission, an independent authority created by the state to finance and build the toll facilities.

1. The toll commission has awarded the largest road contract ever bid in Illinois. This contract, valued at $23,400,765, went to a joint venture group composed of Western Contracting Co., Sioux City, Iowa; M. J. Boyle & Co. and S. A. Healy Co., both of Chicago; and Ryan Construction Co., Evansville, Ind.



Three-part Illinois toll highway is a giant traffic syphon stretching out and around metropolitan Chicago. The system will open in two stages for traffic this year.

2. The commission is building the first large tri-level interchanges in the state. Such design was necessary to reduce the amounts of high-priced Cook County land required.

3. It is also making widespread use of precast, prestressed concrete bridge girders in building some 265 grade separations and other types of bridge structures.

Three Divisions

Looking at a map, the motorist will find that the 187-mile toll system is not one long single stretch of highway between two widespread points, but actually is composed of three distinct elements.

These segments are the Tri-State, Northwest and East-West tollways. The three form a superhighway system legally known as the Northern Illinois Toll Highway.

The Tri-State tollway is a belt route around the Chicago metropolitan area. Approximately 84 miles long, it begins at a point near the Indiana state line, circles around Chicago and then heads north to the Wisconsin boundary. The other two tollway routes follow mostly straight-line courses. They can be considered radial highways which carry traffic in and out of the city of Chicago.

An 18-yd. Cat scraper pulled by a D9 tractor brings in fill for interchange built by Western-Boyle-Healy-Ryan. The $23 million contract is largest ever awarded in state.

The Northwest tollway begins in the north-central part of the state near Rockford and runs 75 miles to the northwestern limits of Chicago. There it meets the Northwest Expressway, part of the large city-county network of expressways now under construction.

The East-West tollway begins at a point near Aurora and runs 28 miles to the western border of Cook County. It joins the well-known Congress Street Expressway, much of which is already open to traffic.

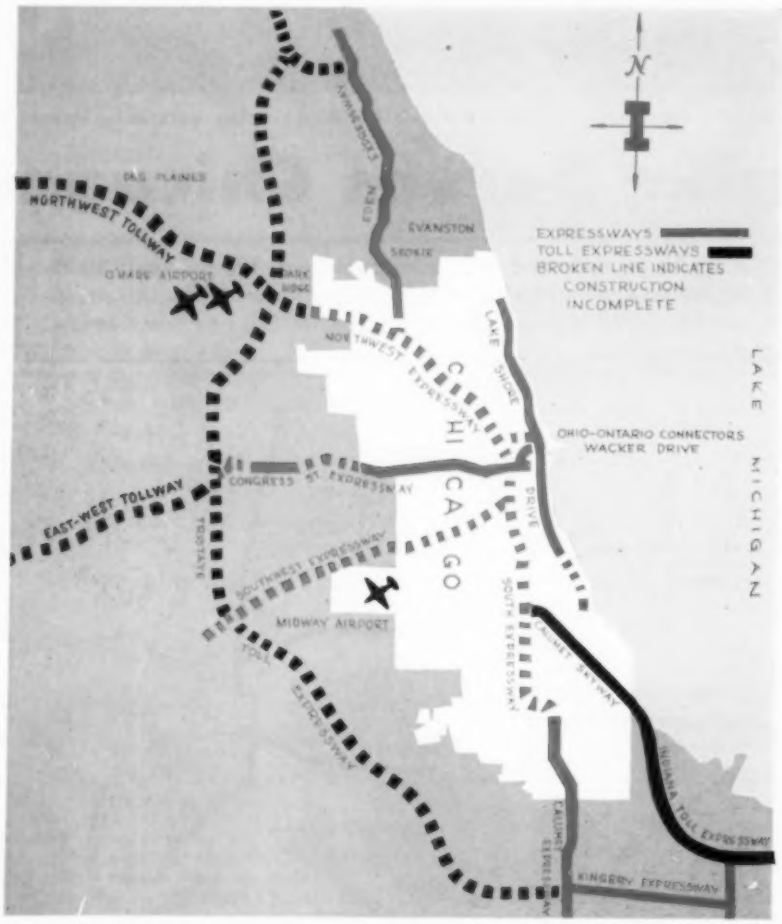
The three-part tollway system has been ideally laid out to serve the passenger and commercial transportation needs of metropolitan Chicago with its 3,716 square miles of communities and 6 million people. Because of its vital location, the toll system has been designated part of the federal system of interstate and defense highways, except for the short 28-mile stretch between Aurora and Chicago.

However, the interstate highway designation does not mean that the Illinois toll system will be converted from a turnpike into a free highway. Under present federal road legislation, there is no provision for reimbursing any of the various toll authorities in the United States for the multi-billion dollar cost of toll facilities.

Incorporation of the Illinois toll highway into the interstate system, however, does insure that new federal roads are going to be built in such locations that interstate traffic will be channeled into and make use of the toll system.

Here's how the Illinois toll system fits into the interstate traffic picture.

South of Chicago the Tri-State route



Here's the highway picture. Tri-State route connects with Indiana toll road; East-West route with Congress Street; Northwest route with Northwest expressway.

(Above) A Euclid TC-12 twin-engined dozer draws twin Bros sheepsfoot tampers hooked up in tandem with a Rome disc, which chops up clay embankment material.

(Below) Jackson tamper consolidates 4-in. granular base course placed over subgrade material. A Ford engine drives six electric motors attached to tamping plates.

will be linked to the Indiana toll road. There will not be a direct connection between the two turnpikes because the neighboring state's toll road, which was completed in 1956, was planned to serve the Chicago-Hammond industrial district farther north. The Indiana road terminates into the Calumet Skyway, an 8-mile long municipal toll bridge leading across Chicago's south side.

Engineering studies showed that land acquisition costs would be too high to bring the Tri-State route into the heart of the city and join it directly to either the Calumet Skyway or Indiana toll road.

Consequently, traffic engineers decided to make use of an expressway already existing in southern Cook County. This high-class, limited-access route, known as the Robert Kingery express-

A Transit Crane carrying a 2-yd. Hendrix bucket excavates substructure of bridge pier for Tri-State road near 135th Street.

Pettibone-Mulliken 2-yd. rubber-tired loader feeds sub-base material from stockpile to rear-dump. Batching plant is charged by a ¾-yd. 22-B using Kiesler clam bucket.

way, was built several years ago as part of the Cook County-Chicago expressway plan.

Linkage between the Illinois and Indiana turnpikes is accomplished via the Kingery expressway and a short 4-mile spur (parallel to Indiana route 912) between Kingery and the Indiana toll road.

From the Kingery, the route of the Tri-State swings in a westerly direction to circle around the more densely populated areas of Chicago and then heads north to the Wisconsin border.

The Tri-State will terminate directly into interstate route 94, now under construction between the Wisconsin-Illinois state line and Milwaukee. Interstate 94 will replace the present US route 41.

The Northwest tollway runs through five northern counties and connects with interstate 90 near South Beloit, Ill.

The East-West tollway is primarily an interurban facility that terminates into the present US route 30, the well-known Lincoln Highway.

52 Contract Sections

In awarding contracts for the $441 million Illinois project, the toll highway commission broke down the construction task into 52 separate contract sections from three to eight miles long. Each of these contracts is a package deal covering grading, drainage, structures, paving and other provisions.

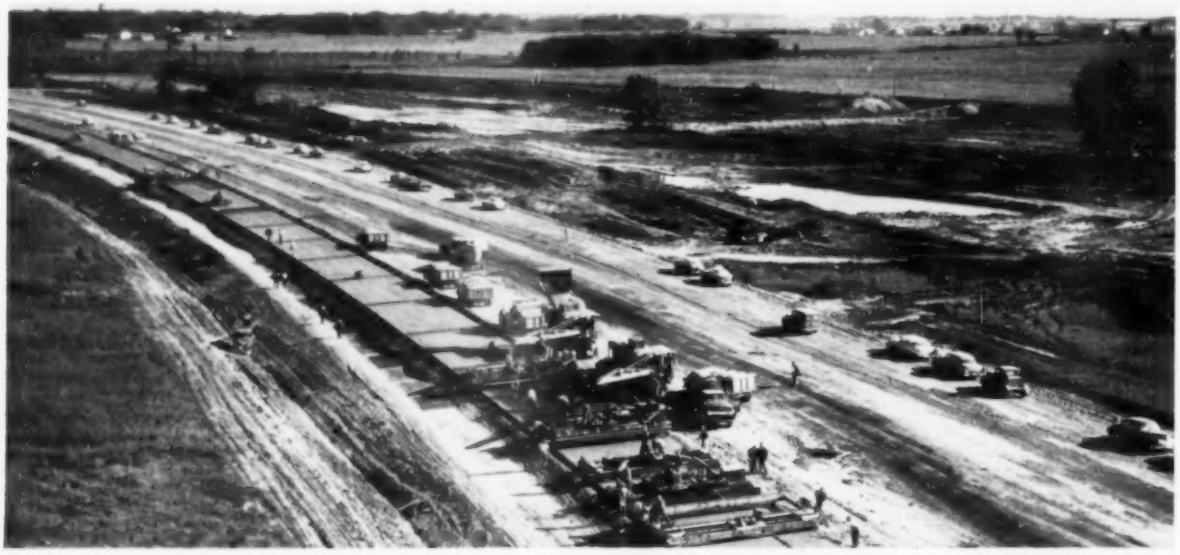
The first of these contracts was awarded in mid-1956 and the first scraper load of dirt was hauled on September 22 that year. During 1957, the assignment of all construction and supply contracts was completed.

Many of the contractors now active on the Illinois project took important roles in building the neighboring Indiana toll road. The contract award list is a blue book of some of the best known American construction firms. Many of them are multiple contract holders and are performing work at widely scattered locations. Because of the size and complexity of the contract sections, many of these firms have combined forces to operate as joint ventures.

At work at the present time are 15,000 men and construction equipment worth an estimated $150 million.

The job being performed by this huge task force is immense. The materials requirements are about 3 million cubic yards of concrete; 127,000 tons of structural and reinforcing steel; 406,000 linear feet of precast, prestressed concrete bridge girders and beams; 747,000 linear feet of pipe culverts and storm sewers; and excavation of 73 million yards of material.

Engineers of Joseph K. Knoerle & Associates, Baltimore, Md., consulting engineers to the toll highway commission, have calculated that if all the earth to be moved on the Illinois toll highway were placed within a one-mile square



Here's a typical paving operation. Trucks carrying proportioned mixes of cement, sand and aggregates feed loads into Blaw-Knox Multifoote 34-E dual drum pavers. A spread like this will lay a 25-ft. wide ribbon of concrete 3,000 feet long in one shift.

area, the dirt pile would reach 74 feet high.

At times when contractors' spreads have been running at full speed, the weekly excavation total has been more than 1 million yards. The paving effort has turned out a mile of concrete daily.

From all this material and labor, the end product will be one of the finest throughways in the nation. The double-barreled highway will have two, and in some places, three traffic lanes in each direction. In heavy traffic areas, the twin strips of concrete will each be 37 feet wide; in less traveled sections, each pavement will be 25 feet wide.

An unusual design feature is the fact that a large portion of the toll system now being built with 25-ft. pavement can be easily widened to 37-ft. width. A generous size median and extra wide bridge abutments and pier bases will simplify the future widening task and reduce its cost.

The standard median width in the six-lane sections is 30 feet. In four lane sections the width is greater—54 feet—to accommodate the extra lanes.

The outside shoulders are bituminous material, 11 feet wide, which will permit emergency parking of vehicles clear of the main lanes. Inside shoulders will be five feet.

There will be no sharp curves or steep grades; however, the monotony of long straight stretches of road will be broken by gradual curves deliberately designed into the route location.

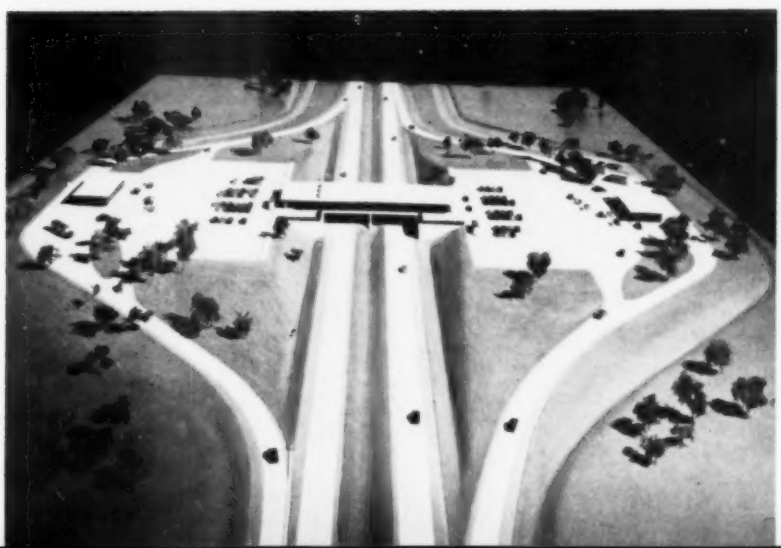
The grade will be controlled to 1/16 of an inch in direction, elevation and tilt. On slopes the road will rise not more than 1½ feet in 100 feet or less than 2%. Fill sections less than 10 feet in height will have 4 on 1 side slopes; those over 10 feet will have 2 on 1 slopes. Continuous guard rail will be placed on all embankments over 10-ft. height. In addition, the entire right-of-way will be fenced.

A Speedcrane positions an 80-ft. prestressed concrete girder on overpass structure. Such girders were used on 222 of the total number of the turnpike's 261 bridges.

Specifications call exclusively for portland cement reinforced concrete pavement 10 inches thick, capable of supporting heavy axle loads. The concrete pavement is placed on four inches of granular subbase and from eight to 10 inches of special frost-resistant subgrade.

Travel on this fast, safe dream road will be all pleasure for motorists. Service and restaurant facilities are being built at 20 to 30-mile intervals, and they incorporate the latest ideas for motoring comfort.

Restaurant and service areas will look like this model. An access road from each direction of travel leads to gas stations and unique "over the tollway" dining area.



Unique Service Areas

The Illinois toll commission has planned "over the road" restaurants so that patrons will watch tollway traffic flowing beneath them while they dine. These restaurant bridges will be about 240 feet long and 90 feet wide. Adjacent to the restaurant structure spanning the roadway will be filling stations, one on each side of the road.

The idea behind this kind of layout is not only to give motorists a bird's eye view while they lunch, but also to conserve land and reduce the personnel required to operate the restaurants and service stations. For instance, when traffic is particularly heavy on one side of the opposing travel lanes, filling station attendants will be shifted from the

This Boyle-Ryan borrow pit is located south of O'Hare Field. Dragline in foreground is lengthening pit by cutting a wide trench with its Bucyrus-Erie 1¾-yd. bucket. Trench gives working room for the 3½-yd. buckets of heavy draglines in background.

lighter-traveled side to the busy side via the restaurant bridge. It will not be possible, however, for a vehicle to cross over from one direction of travel to the opposite by means of the service area.

The concession to build and operate the service facilities of the entire toll highway system has been awarded to the Standard Oil Co. (Indiana) in competitive bidding. Standard is building five of these service stops at a cost of $13 million. The firm is subletting the restaurant rights to the Fred Harvey chain of Chicago.

In mid-summer, two portions of the toll system will be opened to traffic. This will include the entire length of the Northwest tollway and about 25 miles of the Tri-State route from the Wisconsin border south to Deerfield, Ill.

The remainder of the system will be ready for traffic on December 31, according to present plans. Toll commission officials have stated that the overall construction picture is on schedule and there is no reason to believe that the opening date plans will have to be changed.

Contractors have worked furiously to beat deadlines. Last year, at times, earthwork was running as much as 10 weeks behind schedule. Construction bosses made up this time by working double 10-hour shifts seven days a week.

Typical Midwest Job

Excavation problems on the Tri-State (also the other tollways) are practically identical with those encountered on the Indiana and Ohio toll roads. The land is flat prairie and there are few rock cuts. Grading is a scraper job for the most part. However, in some areas, finding suitable borrow on the job sites is no easy matter. The contract section being performed by M. J. Boyle & Co., Chicago, and Ryan Construction Co., Evansville, Ind., is one of these problem cases. Here's how Boyle-Ryan handles its work.

The joint venture's contract T-7A is 4¼ miles long, requires about 2.3 million yards of embankment and is valued at $7,662,340. The contract was let in April 1957, but hauling of borrow didn't begin until September. The job site is just south of O'Hare International airport along US route 45.

Embankment is the chief item in the contract. Structure-wise, the contract is fairly simple requiring five grade separations and two large box culverts.

Ordinarily, this kind of dirt hauling operation would be easy. Building a superhighway in suburban northwest Chicago, however, is much different

Big 20-yd. semi-dumps, consisting of Mack B63 diesel trucks and Fruehauf trailers, line up on the haul road behind three 54-B's.

(Above) A 54-B, working on rental from John Sexton Co., Chicago, brings up a load of clay with its 3½-yd. Bucyrus-Erie BL bucket. It digs about 2,000 yards per shift.

(Below) Chris Sagge, a veteran of 30 years with M. J. Boyle & Co., is general construction superintendent for Boyle and bosses all of the firm's work on the tollway.

from building the same piece of road out-state.

The right-of-way of T-7A passes through high-priced, developed commercial and residential land. Borrow material can't be picked up just anywhere along the route because the properties are valuable. A lot of long distance hauling is the only practical solution for Boyle-Ryan.

Construction equipment working along the right-of-way cross busy highways, which Boyle-Ryan must keep open, cutting down operating efficiency of men and machines.

Another factor hampering progress is poor drainage conditions in the area. The water runoff situation becomes acute during heavy rainfall because none of the numerous mushrooming suburbs have storm sewers to carry off the excess. The result is mud and mushy borrow pits.

Last but not least is the job of relocating utilities—including gas, electric, water, telephone and electric lines. Along St. Charles Road, for instance, Bell Telephone's main line leading west from Chicago had to be moved with all the care due this important communication facility.

Three Haul Methods

Three different types of hauling equipment were used by Boyle-Ryan. Dirt-moving by scraper was the chief means employed and, of course, the cheapest. Of the 2.3 million yards of borrow required, more than half was moved this way. A large number of scrapers—varying between 20 and 30 at different times—was employed. They included Euclid S-18 models with 18-yd. capacity and 18-yd. Caterpillar No. 463's.

Some borrow pits were so wet and sticky that the clay material couldn't be panned out efficiently. It had to be dug out by draglines. To get volume pro-

duction, Boyle-Ryan concentrated heavy, big-capacity rigs side-by-side in the pits. One such pit had two Bucyrus-Erie 54-B diesel machines equipped with 3-yd. buckets loading into 12 Euclid bellydumps. These dumps were 25-yd. capacity LDT's. Some 900,000 yards were to be moved by the bellydumps.

Still other considerations prevented the use of either scrapers or the bottom-dump haulers. Where traffic-clogged roads had to be crossed or when hauling distances were long (sometimes as much as seven miles), trucks were needed. A hauling subcontractor was hired.

Greco Contractors, Inc., a Chicago firm that specializes in dirtmoving, brought in its huge fleet of semi-trailers and six-wheelers—the same spread which hauled a large portion of the embankment fill for the Calumet Skyway in the southeastern part of the county. Total material scheduled for movement by truck was 800,000 yards.

Six different borrow sites were picked by Boyle-Ryan. The biggest of these was located along County Line Road near Grand Avenue. There three Bucyrus-Erie 54-B draglines and one 38-B were spaced out just far enough for easy drive-through loading procedure. Two of the 54-B's were owned by Boyle; one had a 3½-yd. Hendrix perforated bucket and the other a 2½-yd. Page. The third 54-B was on rental from John Sexton Co., Chicago, and it carried a 3½-yd. Bucyrus-Erie BL bucket. The 38-B was rented from Greco Contractors and it was equipped with a 1¼-yd. Bucyrus-Erie BM bucket.

Output during a regular 8-hour shift totalled about 7,500 yards for the four rigs. With the trucks lined up three and four deep along the haul road, the draglines rhythmically dumped big, heaping loads into the truck beds.

The long approach roads to the pits were dressed up constantly by a grader to give good traction to the fastmoving vehicles. The trucks lined up three and four deep behind the draglines waiting their turn to move under the dragline booms, load and then pull out.

23 Semi-Dumps

In the hauling fleet were 23 semi-dumps. The truck-tractors were Mack B63 and International K-190 diesels; the trailers had Fruehauf and TEC bodies with a capacity of 20 yards flat and 25 yards with crown. Under the bodies were Galion twin-piston hoists. There was also a total of 26 Mack B42 six-wheel end-dumps, each of which had a 12-yd. capacity.

The borrow pit where the draglines and trucks were working is located on the property of the Maywood Sportsmen's Club. It is 800 feet wide and a half-mile long. After close to a million yards have been excavated from the pit, it will be flooded and stocked with fish for the benefit of club members. An interesting side light of the Illinois toll system is the fact that there are some 32 such borrow pits in various areas which will be converted to water recreational areas when the project is completed.

The material in Boyle-Ryan's pits is typical of the Chicago area. Clay and silt lie under the topsoil. Draglines were cutting off a 12-ft. layer of soil and subsoil plus some stiff bluish-gray clay underneath. Water content of the clay was above optimum for easy compac-

Continued on page 54

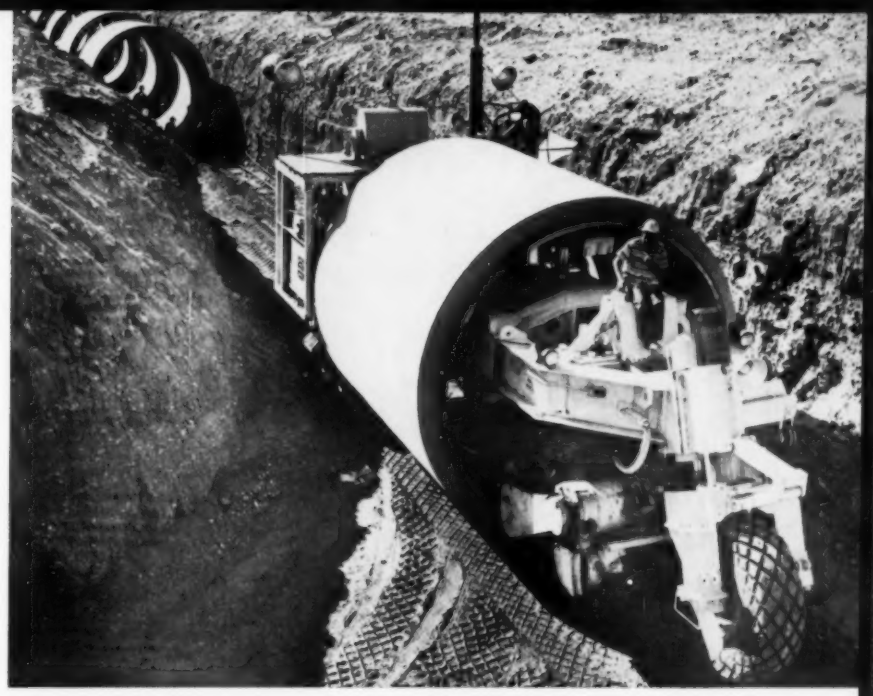
TRI-STATE CONTRACTORS

(Many firms listed below also performed work on the East-West and Northwest tollways. Space does not permit listing of those awards.)

No.	Contractor	County	Length (Miles)	Contract Amount
T-1A	Standard Paving Co. Peter J. Crowley & Co. A. L. Jackson Co. Chicago, Ill.	Cook	3.38	$ 6,985,265
T-1B	Industrial Construction Co. Chicago, Ill.	Cook	(bridge)	1,579,514
T-1C	Condon-Cunningham Co. Peter Kiewit Sons' Co. Omaha, Neb. Paschen Contractors, Inc. Chicago, Ill.	Cook	5.009	8,320,514
T-1D	J. M. Corbett Co. Chicago, Ill.	Cook	(bridge)	2,097,563
T-2ABC	Gust K. Newberg Const. Co. Hoyle-Newberg Const. Co. Chicago, Ill.	Cook	8.34	14,647,248
T-3A	Orr Const. Co. Chicago Heights, Ill.	Cook	3.73	6,099,763
T-3B	Orr Const. Co.	Cook	1.24	2,246,360
T-4A	Condon-Cunningham Co. Peter Kiewit Co. Paschen Contractors, Inc.	Cook	(bridge)	3,231,086
T-5AB	Contracting & Materials Co. Evanston, Ill. Kenny Const. Co. Skokie, Ill. Louis Garavaglia Centerline, Mich.	Cook	5.358	11,297,050
T-6A	Hedges Const. Co. Chicago, Ill. Ryan Brothers Co. Janesville, Wis.	DuPage	2.98	4,995,745
T-6BC	Western Contracting Corp. Sioux City, Iowa M. J. Boyle & Co. S. A. Healy Co. Chicago, Ill. Ryan Const. Co. Evansville, Ind.	DuPage-Cook	7.60	23,400,765
T-7A	M. J. Boyle & Co. Ryan Const. Co.	Cook	4.75	7,662,340
T-8A	Lee Const. Co. Chicago, Ill.	Cook	(bridge)	2,243,488
T-9AB	Contracting & Materials Co. Kenny Const. Co. Louis Garavaglia	Cook	4.39	9,710,990
T-10A	W. F. O'Neil Const. Co. Chicago, Ill. D. W. Winkelman Const. Co. Syracuse, N. Y.	Cook	6.53	5,454,552
T-11A	Eric Bolander Const. Co. Libertyville, Ill. E. A. Meyer Const. Co. North Chicago, Ill.	Cook-Lake	3.07	2,699,792
T-11B	Gust K. Newberg Const. Co. Hoyle-Newberg Const. Co.	Cook	4.52	5,029,002
T-12ABC	Gust K. Newberg Const. Co. Hoyle-Newberg Const. Co.	Lake	12.20	12,193,953
T-13A	Eric Bolander Const. Co. E. A. Meyer Const. Co.	Lake	4.85	4,546,998
T-13B	L. G. Arnold, Inc. Eau Claire, Wis.	Lake	5.09	3,977,569

World's Biggest Water Faucet

by Floyd Suter Bixby



The contractor's answer to placing 68-ton, prefabricated concrete pipe sections for the new siphons is this "Pipemobile." Here it starts for the line with a pipe section.

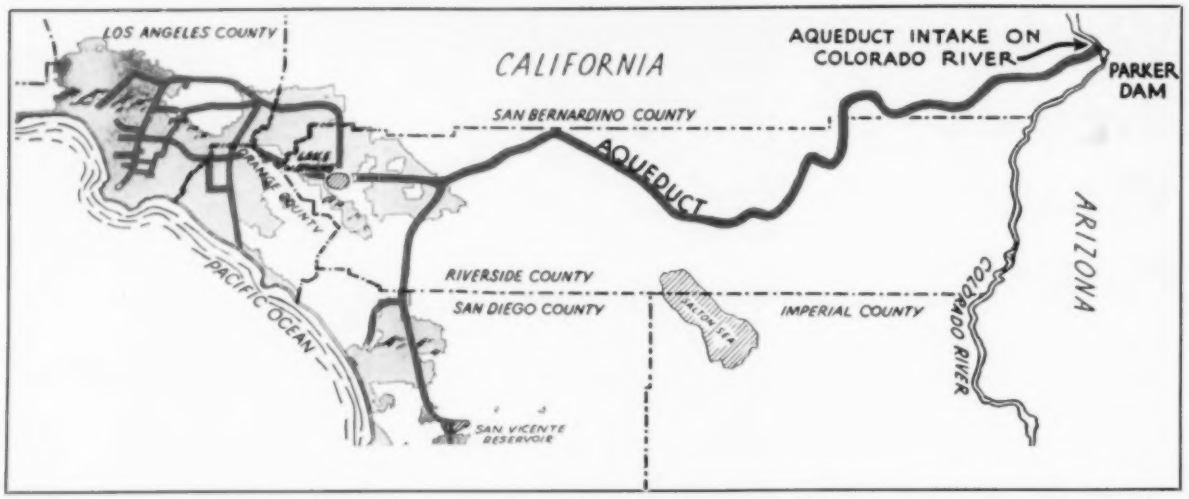
IN chocolate-colored mountain ranges which stretch unbroken across the desert between the Colorado River and the coastal plain of southern California, one of the biggest water-supply jobs in the United States is under way. Forty-seven inverted siphons, whose steel reinforced concrete pipe sections weigh up to 68 tons apiece, are being constructed for the Metropolitan Water District of Southern California. The purpose is to raise the carrying capacity of MWD's aqueduct to an ultimate capacity of 1,800 cubic feet per second—over a billion gallons a day. American Pipe & Construction Co., South Gate, Calif., has the $16 million contract for pipe manufacture and installation.

Billion-gallon-a-day system is enlarged as contractors lay 68-ton concrete pipe sections.

Enlargement of the Colorado River aqueduct delivery system is noteworthy in many respects, all concerned chiefly with the mammoth size of the project. The work also represents an enlargement of one of the seven civil engineering wonders of the United States. That designation was recently given to the aqueduct by the American Society of Civil Engineers.

Present construction carries to its ultimate work which was started in the 1930's and completed in its initial development in 1941. In planning that

This Bucyrus-Erie 54-B dragline with its 70 feet of boom and 3-yd. Esco bucket carries the brunt of ditch excavation for the Metropolitan Water District's new siphons. Tooth marks along the walls of ditch show how tough the hardpan is to excavate.



Tinted areas are locations served by MWD, which supplies water to five counties whose total population is more than 6.5 million.

early work, MWD's engineers built the tunnels, concrete-lined canals and concrete conduits to their ultimate capacity. But, for the most part, only one barrel of the inverted siphons in the system was constructed at that time.

MWD's $200 million expansion program brings the big aqueduct to its full planned capacity. It includes construction of the second and final barrel of the siphons; the addition of pumps to make a total of nine units in each of five pumping stations; increasing the capacity of Lake Mathews; constructing Garvey Reservoir; enlarging the filtering facilities of the softening-filtration plant at LaVerne, Calif.; and constructing miles of large distribution lines, including a second aqueduct to San Diego County.

The Colorado River aqueduct is the longest and largest domestic water supply line in the United States. It has its intake on the Colorado River, two miles upstream from Parker Dam, and extends westerly across California. Total length of the main line, distribution branches and the San Diego feeder line is 621 miles.

Pumps Lift Water

The five pumping plants in the system lift Colorado River water 1,617 feet over mountain barriers. Power to supply the huge pump motors comes from Hoover Dam and is purchased from the federal government. No part of MWD's system is federally subsidized, since financing has been arranged by the sale of bonds and by taxes and water sales revenue.

The main MWD aqueduct system has the following six principal design features:

1) Ninety-two miles of 16-ft. diameter tunnels.

2) Sixty-three miles of concrete lined canals which are 10 feet 2 inches deep, 20 feet wide at the bottom and 50 feet wide at top water level. Maximum width is 55 feet.

3) Fifty-five miles of concrete covered conduit, about the same size as the tunnel.

4) Twenty-nine miles of inverted siphons, varying in diameter from 11 feet 5 inches to 16 feet according to location and operating conditions. Single-barreled siphons are 16 feet in diameter; rectangular siphons consist of three 9-ft. 9-in. square compartments. All told, there are 144 inverted siphons in the system.

5) Three dams: Gene Dam, Copper Dam and Mathews Dam.

6) About 237 miles of 230,000-volt transmission line connecting Hoover Dam generators with the MWD pumping plants.

When the first siphon barrels were built over two decades ago, machinery then available could not handle prefabricated pipe of the required size. The great concrete tubes, therefore, were formed in place and poured monolithically. In a realistic effort to hold costs down as low as possible, and to take advantage of present-day equipment and contractor ingenuity, MWD asked for bids based on three alternatives. The contractor could bid in the 20-year-old cast-in-place method, precast pipe or steel pipe.

No bids were received for the use of steel pipe. Several bids were submitted on the basis of cast-in-place construction. But American Pipe & Construc-

Cat D8 tractors push and pull a 98-ft. long trailer up a steep hill to Pipemobile location. Trailers were specially built to carry pipe sections from prefab yard to job site.

Closeup of Pipemobile shows how it crawls part way through pipe, then lifts the weight by means of hydraulic mechanism. Unit is powered by a Cummins 300-hp diesel.

tion's precast, reinforced-concrete pipe was adopted officially for completion of the second barrel of the aqueduct. Work got under way in mid-1957 and is expected to be finished this December. The 47 siphons, each a job in itself, contain from four to 950 pipe sections, each 16 feet long. The work is scattered from Whitewater to Earp, Calif., a distance of 183 miles.

Excavation Big Job

Trench excavation for the big line is a major earthmoving job. The siphons are located on terrain conditions ranging from level ground to 62° slopes. Pipe trenches pass through desert sand, gravel, extremely tough hardpan and rock. The percentage of rock requiring drilling and shooting will be less than 20% of the total job. This was fortunate because the new line is only 70 feet distant from the old one which is in daily operation. Blasting vibrations, therefore, could be dangerous.

Trench depths vary considerably. One spot calls for a 49-ft. deep ditch, but that's an extreme case. Average specifications call for five feet of backfill cover over the line, so that makes necessary a ditch about 21 feet deep for pipe with a 13-ft. inside diameter and an outside diameter of 16 feet.

The big percentage of trench excavation in everything through hardpan was assigned to a new Bucyrus-Erie 54-B dragline, which American Pipe & Construction purchased especially for the job. It came equipped with a 70-ft. boom. Because the 54-B can stand all it's rated at and more, it was equipped with a 3-yd. Esco bucket; a 2½-yd. bucket is standard for this size machine. The 54-B has a Cummins NHRYS 300-hp engine and torque converter drive.

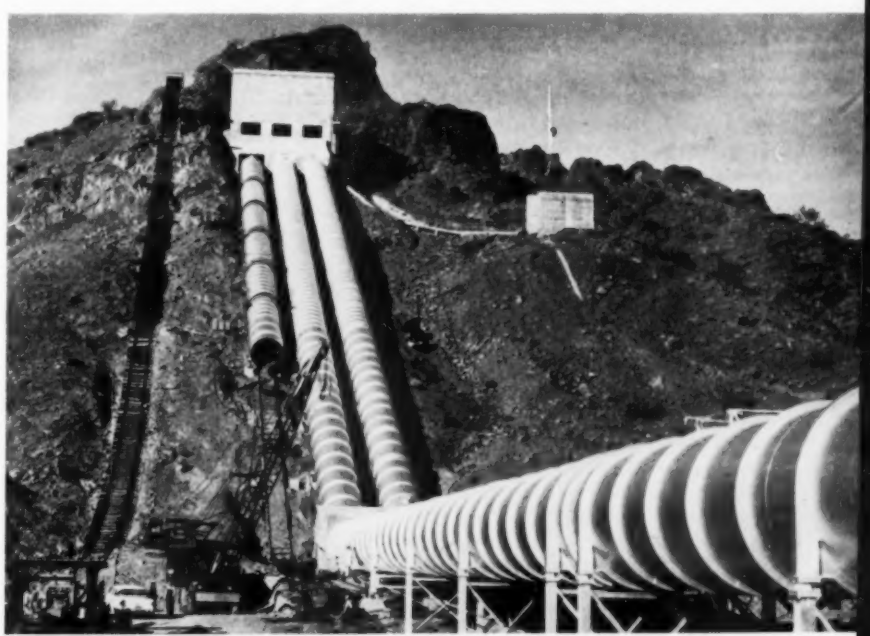
A second dragline also was brought

Radio

Of all the contemporary construction jobs suitable for radio communication, this water supply job is a prime example. Use of two-way radio communication has literally made the job possible.

The project is strung out over 170 miles of desert and mountains. Towns are few and far between. Equipment often works in isolated places under unbelievably tough conditions of dust, heat and high altitude. The area is a poor one for radio transmission because of numerous intersecting mountain ridges which block radio waves.

American Pipe & Construction Company's superintendents and foremen have Karr 2-way sets in their cars and pickups. A central transmitting station is located at the Desert Center headquarters and at the Freda pouring plant. Messages flash over the whole strung-out job—sometimes relayed from pickup to pickup in the difficult transmission zones. The superintendents on the job may drive 400 miles in a day's time as they run the far-flung spread, but the radio equipment lets them monitor the job hour by hour, answer urgent questions and make vital decisions.



This is Gene pumping plant where triple tubes are being fabricated; water is moved uphill through heavy thrust blocks. There are five such MWD pumping stations.

Conveyco batch plant produces cement for 68-ton pipe sections, which lie completed in the background. Cal-Rex truck mixers haul concrete to the point of placement.

The widespread project is under the supervision of Robert B. Diemer, MWD's general manager and chief engineer.

in. It is a 2-yd. American machine and is used in easier digging, according to Project Superintendent Clyde Grant.

On most ditch work, the size of excavation is so great that the machines excavate half the ditch width, including one slope, at a pass. After excavating in this manner for perhaps 50 feet, they move back and bring up the remaining half. Excavated material is dumped along both sides of the trench. Part of it is used later for backfill after the pipe is in. Fuel and lubricants are supplied to each machine by service trucks, or by Cat-drawn sleds in some of the sandiest and steepest places. The 54-B has consistently been digging about 2,200 yards per shift, with occasional peak days of 3,000 yards.

Drilling and Shooting

While trench excavation was not primarily a rock job, there were several places where the toughest kind of rock excavation had to be done, including drilling and shooting. Invariably these areas were in steep mountainous terrain where access was none too good. For that reason, drilling equipment consisted of two Ingersoll-Rand wagon drills, powered by an Ingersoll-Rand 600-cfm Gyro-Flo compressor. Timken rock bits and Ingersoll-Rand's Carset[3] (tungsten carbide insert) bits were used in the hard granite and sandstone formations.

To reduce the blasting jar to a minimum, Hercules 25% stick powder is being used, along with electric delay caps. This slow-velocity powder, column-loaded almost to the top of holes, has done a good breaking job because the rock is brittle and shatters well. Broken rock is being excavated successfully by dragline, with very little secondary breakage necessary.

One of the chief items of interest about the project is the manner in which huge 16-ft. pipe sections are built and transported to the job sites. Never before has pipe so large been prefabbed, hauled and set in place in sections. The 68-ton pieces are so big that special 98-ft. long trailers, pulled by Sterling trucks, had to be built to carry the loads. Even then the company had to build about 70 miles of its own road; with the exception of the Desert Center to Rice highway, loads were not permitted on the state highway system.

Fabrication of reinforcing steel cages is being done at American's Fontana (Calif.) yard. These completed cages are then transported by rail to a pipe manufacturing center at Rice, about 50 miles west of the Colorado River. They are handled there by an American Maximounted yard crane.

Pipe section manufacturing is big business, with about 420 cubic yards of concrete placed every day, six days a week. The yard is arranged with plenty of work room. Water is no problem because it's available from the nearby aqueduct. Concrete aggregates and sand are being produced under a separate MWD contract with Gunther, Shirley

Michigan tractor-shovel scoops up aggregate for the concrete plant (background) at the pipe manufacturing center in Rice, Calif., 50 miles west of the Colorado River.

& Lane. Bulk cement is hauled in from commercial plants at Colton and Riverside, Calif.

Fourteen sets of steel forms are being used to fabricate the pipe sections. They were designed especially by American's engineers so that the big pieces would have precise dimensions when finished and go together easily. Fresh concrete is being batched through a Conveyco batch plant, whose hoppers are supplied by a Michigan tractor shovel and a bucket elevator system. Cal-Rex truck mixers haul concrete to the point of placement, where 1-yd. transfer buckets are swung to the pour by a Lima yard crane. Vibration is compressed-air powered by Chicago Pneumatic 600 Power Vane and Ingersoll-Rand 600-cfm Gyro-Flo machines, supplying air to Jet Shaker external-type vibrators.

After the pours are finished, the pipe sections receive a live-steam cure under a protective jacket for 12 hours. They are then cured further by a seven-day continuous application of water.

Stiffen Pipe

The big pieces are stiffened prior to shipment by multiple rows of pipe jacks set inside the 13-in. concrete walls. One piece is hauled per trip by the four big Sterlings and their special trailers. These trailers are equipped with their own winches so that they can unload the pieces at the job.

How do you handle 68-ton pipe lifts on slopes which often exceed 1 on 1? American Pipe's management asked itself that question and came up with an ingenious answer called the "Pipemobile". The Pipemobile is a powerful, self-propelled machine which literally crawls through a pipe section, takes the weight of ponderous tons by lifting the pipe with powerful hydraulic mechanisms and then carries the pipe to its placement point. The machine has hydraulic adjustments which permit the pipe to be moved any way necessary to line it up with the section previously laid, so that the closure of the steel and rubber gasket joint is accomplished by a simple forward movement of the Pipemobile itself.

Electrically Controlled

The Pipemobile is powered by a Cummins 300-hp diesel, which generates electricity for propelling and steering motors and for hydraulic pump operation. On slopes up to 15° the machine can work unaided. On slopes up to 35°, it is assisted by a Caterpillar D9 tractor with front-end bulldozer and Hyster rear-end winch, which help to steady the machine. The Pipemobile is also equipped with a winch line, which allows it to handle the heavy weights on the 62° slopes on the Little Morongo Wash siphon and San Andreas siphon.

Pipe sections have to be rehandled in some cases before the Pipemobile can pick them up. After being unloaded by the special trailers, they are picked up again by a relay trailer, which is towed by several Cat D8's. Where installation sites are high up in the desert mountains, it takes two D8's pulling and one pushing to get the pipe up steep access roads to the machine. Once it's there, the Pipemobile can lay about 15 joints a day with ease. On level ground the machine laid a maximum of 29 joints in one nine-hour shift.

Special equipment takes still another form on this unique job. A special mobile carpentry trailer has been built to handle the many transition structures which will tie the siphon pipe to covered canals, tunnel portals and so on. The special machine eliminates wasted manhours of labor setting up shop at each of the many locations and streamlines the work. Plywood form facing, 2x6 studs and external ties are usually the only supplies which have to be hauled in.

The rig was built on a large, used utility trailer. An electric powered band saw, a Comet table saw and a heavy-duty radial saw were mounted permanently on this low-bed. The rig also has its own diesel-electric generating set and lights for night operation, if that should be required.

The hit-and-run operation of this rig gets transition forms built quickly. The inner forms and outer forms are externally supported during pours so that bolt holes will not be present to cause leakage. Concrete at locations served by this rig is being batched by a small travel batcher, with truck mixers supplying the material to the pours.

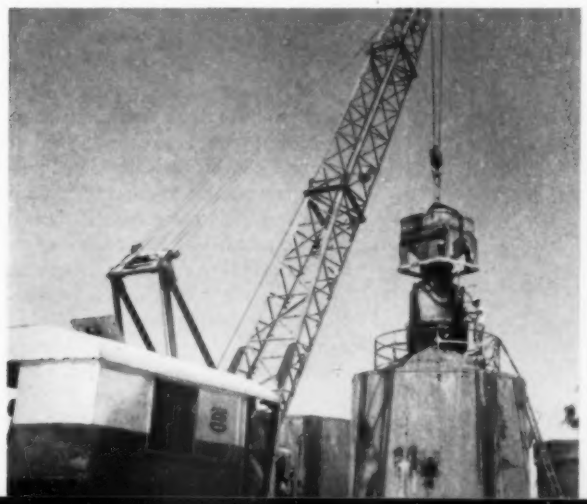
Ingenuity, special equipment and conventional machines are paying off. The job is ahead of schedule and should be finished well ahead of its deadline next year. The completed work will double the water carrying capacity of southern California's most important water supply line and permit further growth of the rapidly expanding area.

Personnel

The project is under the general supervision of Robert B. Diemer, general manager and chief engineer of the Metropolitan Water District. Robert A. Skinner, assistant chief engineer, was in charge of the design of the siphons. Henry J. Mills, construction engineer, is in charge of the installation of the pipe and appurtenances for the district.

For American Pipe & Construction Co., O. M. Hooper is project manager; Ed Butler is assistant project manager; Clyde Grant is field installation superintendent; Hugh Hoffman is plant superintendent at the Freda pipe yard; Jeff Fletcher is transportation superintendent; Jack Johnson is steel fabricating superintendent; and Spence Leister is office manager.

(Left) Lima crane swings 1-yd. concrete transfer bucket to the pour. Heavy steel forms (right) are used to fabricate the pipe.



They Mine Sulphuric Acid

California's oldest continuously-operated mining property enters its 62nd year with modern open pit work in iron pyrite in an area where 110 inches of rain and snow per year are common.

by Ray Day

ONE of America's most unusual mines is located in northern California's Shasta County, high on the cool, green ridges of the Sierra Nevada mountain range. One company has owned and operated this mine since 1896. That makes it California's oldest continuously operated mine. At various times the property has produced copper, gold, zinc and silver. Today, responsive to current market demands, the mine is supplying iron pyrite ore, rich in sulphur, for the manufacture of sulphuric acid.

Many underground methods were used during the past years by Mountain Copper Co., Ltd., the original owner, to extract the valuable minerals from the ground. There was a fabulous era long ago when ores containing over 8% copper were taken out. Gold and silver mining make other chapters in the mine's long and colorful history.

Now all that remain of early diggings are crumbling foundations of old concentrating plants, or faint outlines of a mining camp where bunkhouses and messhalls once stood. Today's operation is completely modernized. It's an open pit scheme that was introduced two years ago and has the latest in big capacity shovels and hauling units.

A 4½-yd. Bucyrus-Erie 110-B electric shovel loads waste material into a Euclid 36-TD end-dump truck at the Mountain Copper Co. iron pyrite mine in northern California.

Even the name of the company has been modernized, in a sense, in line with modern business organization practice. The property is now operated under the name of Mountain Copper Co. of California, a wholly owned subsidiary of the parent firm.

From an excavating man's standpoint a number of things make this operation somewhat unique. The ore being handled is a massive iron pyrite whose specific gravity is an incredible 5.0, and whose Moh's hardness factor is between 5.5 and 6.0. The pyrite formation is so hard that in 18 inches it can burn the gauge out of a tungsten carbide drill bit. The ore material is abrasive, heavy, hard to dig and difficult to haul.

The present stripping ratio is 8 to 1 and it isn't likely to diminish. Much of the overburden is abrasive and hard. Large underground caverns and openings make shooting the overburden very difficult.

Study Market Potential

The firm's investment in open cut equipment was made only after an exhaustive study of the marketing potential for iron pyrite. A continuing outlet to chemical companies in the San Francisco Bay area looked promising. In addition, the parent company (Mountain Copper Co., Ltd.) has owned and operated a chemical plant near Martinez, Calif. Thus, the pyrite could be marketed to several companies, the sulphur content could be removed and calcine, a by-product, turned back to parent com-

pany headquarters. Mountain Copper Co., Ltd., stores this calcine and is working to develop a process for treatment which will make it profitable to extract the various amounts of iron, copper and zinc from the material.

Conversion from the underground induced caving method to an open cut operation began in April 1955, when the first benches of stripping were opened high on a ridge above the old mine adits. Proper organization of stripping was vital. The terrain is steep, and it is exposed to heavy rains and snows. The yearly precipitation total reaches a maximum of about 110 inches, although in one recent year, the snowfall alone was 140 inches.

The overburden material varies from reddish dirt to very hard silicified rhyolite and quartz porphyry. C. W. McClung, mine manager and company vice president, was quick to realize that stripping locations would have to be coordinated with weather and seasons.

With this in mind, he is doing waste stripping on the high benches during the dry summer and fall months when haul roads are accessible and easy to maintain. When bad weather comes, the equipment is moved farther down in the pit to a point where the formation is rockier. In that way, even winter snows can't tie the equipment up for very long.

Development of the open pit has been planned for a series of 40-ft. benches arranged in the usual contours over the pit area. The first benches are being developed with 150 feet of working space at their bases. This gives hauling equipment plenty of room to maneuver and operate with best efficiency. An index of the success of this method is the 4,500,000 tons of waste stripping that has been moved since operations began three years ago.

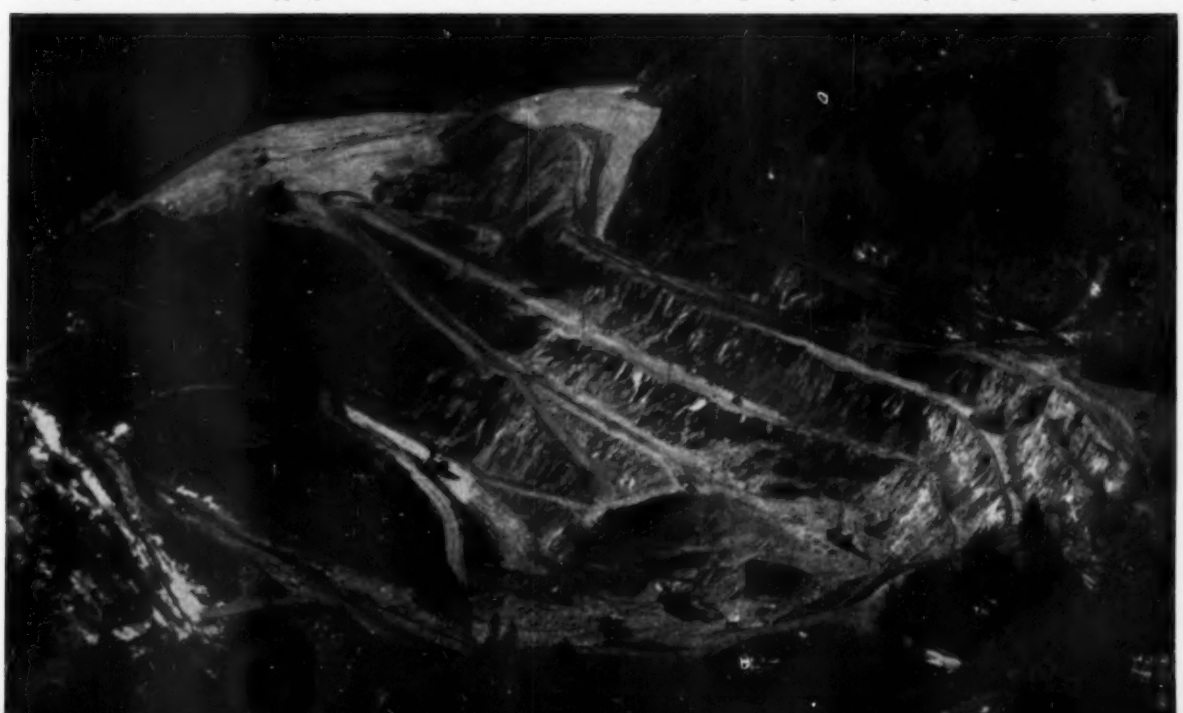
W. C. McClung (left), vice president and manager of the mining firm, keeps a close eye on operations, telling Pit Superintendent W. H. Calhoun how to handle an area.

Blast Hole Drilling

Waste material drilling is being handled by a Joy 58-BH Heavyweight Champion rotary drill. Crawler mounted, it uses Hughes W-7R tri-cone bits to sink 7⅞-in. diameter holes. Two drill additions have converted the machine from a stock model. Its original air compressor, which delivered air at 100 psi, has been changed to a single-stage machine which delivers 60-psi air in a much greater volume. An auxiliary water pump has been added which dampens the drill dust emerging from the bit. The roto-clone dust collector thus is inoperative. The Joy drill was purchased from Calaveras Cement Co., San Andreas, Calif.

Average hole pattern for the larger diameter drilling is 15 x 18 feet. Holes

Aerial photo shows how stripping has cut series of benches into mountain ridge. Open pit development began in April 1955.



Pit floor around shovels is continually cleaned up by two Cat dozers. Machine shown above has a cable-controlled blade; the other has a hydraulic angle-dozer.

are drilled 4 to 5 feet below the bench floor grade. Even waste material is difficult to drill. The spacing, only 15 feet from the berm edge, sometimes crowds the machine for room, especially when some caving has occurred. If the formation varies from hard to soft, or caverns and caves show up, drilling is particularly difficult.

Powder loading usually is done immediately after a block of holes has been drilled. The area is cursed with heavy ground water, so that use of gelatin-type explosives is almost mandatory through late fall and winter months when it is not unusual to find drill holes filled to their collars with water.

During the summer, when holes are drier, use of the ammonium nitrate fertilizer explosive is practical. Hercules powder is being used almost 100%.

For ammonium-nitrate shooting Hercules Tritex in fiber-asphalt bags has been selected. The asphalt lined bags give the explosive charge considerable protection from ground moisture. Triggered by a cartridge of 40% gelatin, the ammonium nitrate results have been good in dry ground. Reinforced Primacord detonating fuse leads up to ground surface from the detonating cartridge and is tied to plain Primacord trunk lines which lead off toward the side. Primacord MS connectors delay time intervals between the rows a few milliseconds. The biggest single shot to date has been about 30,000 pounds.

Overburden Shovel

Waste material is handled by a Bucyrus-Erie 110-B electric shovel equipped with a 4½-yd. Bucyrus-Erie dipper. Shortly after the machine was delivered in 1955, the dipper was equipped with Esco adapters and Esco R7 teeth. With a minimum of preventive hardfacing, this dipper handled 4½ million tons of stripping before it was rebuilt. Welders are working on it now during their odd moments, and it will be ready as a standby soon to dig again another day.

The 110-B has a pressurized cab and filter system designed by Reese Blowpipe Co., Oakland, Calif. Purpose of the

This electric shovel, cutting an access road into the orebody, loads out an average of 5,000 tons of waste material per day.

Filters for dust eliminating system on 110-B shovel are cleaned with detergent and water in a Hobart dishwasher salvaged from the messhall of an old mining camp.

pressurized cab is to keep dust out of the electrical control system and moving gears. The Reese system consists of a 5-hp Sturtevant axi-vane blower, which pulls air through 18 American air filters. Periodic cleaning of these filters posed a problem until somebody discovered—when an old messhall was torn down recently—that the Hobart dishwasher was exactly the right dimension to handle these filters. So, the old dishwasher is doing a job now in the maintenance shop, cleaning the filters with detergent and hot water. After the filters are cleaned of dirt and oil, they are dried, dipped in Standard Oil Filtercoat conditioner, drained and stacked for re-use.

The 110-B and the Joy drill are powered by electricity supplied through a somewhat unusual delivery system. Power is brought in from Pacific Gas & Electric Co. at 12,000 volts; it then is stepped down to 2,300 volts for transmission to the machines. A special safety feature, suitable for a pit where machines are not too numerous, has been devised. A power failure anywhere in the pit automatically kicks off all power back at the transformer station. The system uses type SHD cable with three conductors plus three ground wires and corona shielding connected with the ground wire to the equipment being powered. Polarized connectors of various sizes are used, making it impossible to plug a connector in the wrong socket. A visual numbering system is also used on power transmission lines, which are four conductor combinations of 0-1-2-3, with 0 the ground wire.

The numbering system makes it impossible to reverse a power phase in any hookup. It also makes practical use of the electrical corona around individual cable wires.

To further safeguard the electrical system, all spliced joints are hot vulcanized in the field. Special tongs, suggested by an official of the safety division of the United States Bureau of Mines, were made in the company shop. They are simple and foolproof, having two forked fingers set slightly farther apart than the diameter of the cable. One finger turns one way; the second the other. To pick up the cable, a ground man needs simply to straddle the cable with the device and give it a 90° turn. The cable then is suspended on both fingers of the carrying tong and can be safely moved.

According to company officials, the 110-B is giving good service. Now in its fourth season, the machine has loaded out as much as 9,000 tons in an 8-hour shift. It averaged slightly more than 5,000 tons a shift for the first year and is now averaging somewhat more than this amount.

The pit floor around the shovel is cleaned up continually by one of two Caterpillar D8 tractors. One D8 is equipped with a hydraulic angledozer, the other with a cable-controlled blade. The 110-B shovel loads four 36-TD Euclid 16-yd. end-dump trucks, taking three passes per truck. The Eucs are equipped with 300-hp Cummins diesel engines, Allison Torqmatic transmissions, torque converters and Euclid retarders. According to McClung, the retarders, mounted between transmission and rear end, work especially well and have given trouble-free performance.

Waste Disposal

Waste hauls are short, seldom reaching over 1,500 feet. Also, thanks to the method of laying out benches and berms, waste haul roads have negligible inclines. Dumping space for waste material is practically unlimited. Millions of tons are being spilled over the edge of a spectacularly steep soil pile. The waste will eventually cover an old quarry where gossan caprock was mined 30 years ago for its gold and silver.

Orebody drilling is handled principally by a Joy Challenger percussion drill, using 2-in. diameter steel and Brunner & Lay Rok-Bits in 3½ and 4-in. diameter. In selecting Brunner &

Special four-way connections send high voltage into machines. Fourth connection is a ground wire for maximum safety.

(Left) A 1½-yd. shovel works in orebody. (Right) At bottom of tramway finely crushed ore pyrite is loaded into railroad cars.

Lay bits over other types, the company was judging from the excellent performance they gave when used in underground mining. The bits have given a good account of themselves on the surface, too, where material is of the same hard consistency.

In selecting Rok-Bits, a cross type was picked over the more universally popular X-type because the former can be sharpened and reconditioned more quickly and easily. Crossbits also rifle less then the conventional X-type. Hardness of the ore made bit sharpening a major problem and use of crossbits has resulted in substantial time savings.

Bit footage varies. Extreme cases of exceptionally hard orebody may limit a bit's life to 18 inches, but generally they go through about 8 feet before re-sharpening is necessary. The bits take a maximum of 10 sharpenings, then must be discarded.

Drill steel for the Joy Challenger is made in the company machine shop. The 20-ft. long, 2-in. diameter sections are conditioned and threaded in the shop's lathe section. Steel is tempered under exact pyrometer control. The thread pattern permits the use of bits without adapters.

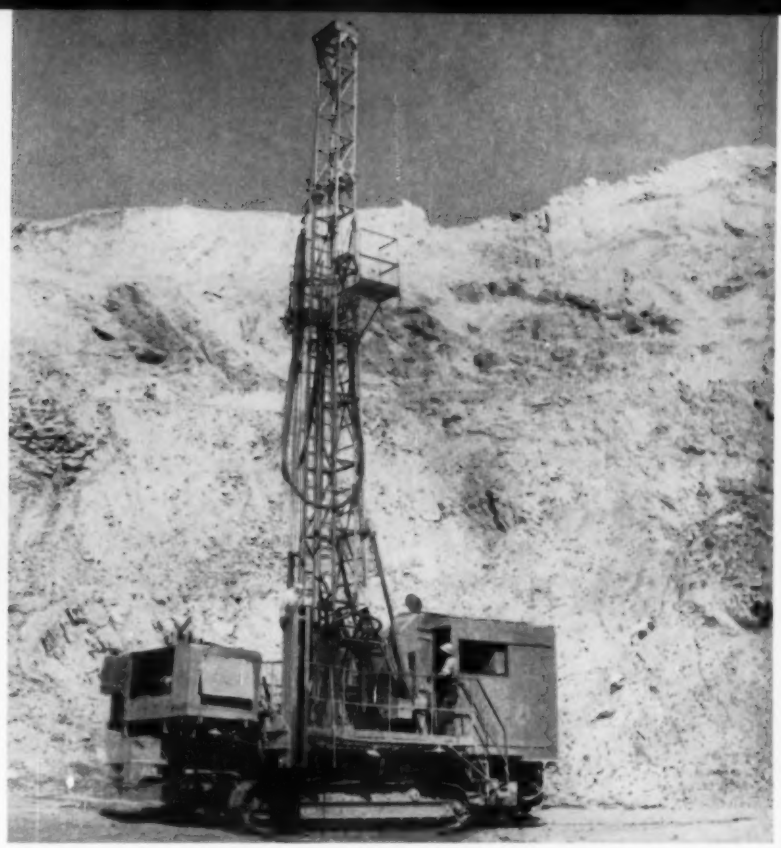
Drill patterns average 6 feet on centers, with holes 16 feet deep. The holes are loaded with the same type powder previously described for waste overburden shooting. These shots also are fired by Primacord and MS connector delays. The broken ore is presently handled by a newly purchased Bucyrus-Erie 38-B shovel with a 1½-yd. dipper. A 22-B shovel was selected for ore loading when operations began, but the material was so heavy and the bank so tough that a 38-B was substituted a few months ago. The 38-B's high maneuverability, enabling it to easily negociate the steepest ramps, and its ability to handle the ore without difficulty has proved a good investment, according to company officials.

The 38-B has a torque converter and is driven by a Caterpillar diesel engine. Two Euclid 36-TD end-dump trucks are used with the 38-B. They haul down a 32-ft. rock ballasted haul road, 8,000 feet long, built on a uniform 7½% descending grade between pit and crusher.

Because iron pyrite is extremely heavy (its iron content is about 40%), loads are limited to 25 tons even though Euclid beds are twice that capacity. Trucks are weighed on a set of Murphy scales before leaving the pit. The haul road is maintained by a Ford F-800 water truck for dust control and by a Caterpillar No. 12 motor grader for smoothness control. Actually, the 38-B and its supporting Eucs have an easy job, for ore production now is limited to a single-shift operation and a 400-ton per shift schedule.

To reduce the ore to pea-gravel size before shipment, it is sent through a crushing setup, whose flow begins at the low end of the haul road. Loaded Euclids dump ore into a feeder trap, whose outlet is a 48-in. Telsmith apron-

Buildings were erected high on the mountain to protect crushers, screening units and tramway from rain and snow which, in some years, total as much as 110 inches.



Waste material drilling is done with a Joy 58-BH rotary type drill using Hughes W-7R tri-cone bits to sink 7⅞-in. holes. The 40-ft. benches are drilled 4 to 5 feet subgrade.

type feeder. The feeder draws ore from the 50-ton hopper and drops it into a 36x42 heavy-duty Birdsboro jaw crusher, that turns out a minus 6-in. product. This is carried to a 600-ton surge bin, which also forms a reserve stockpile.

Material from the reserve bin is fed by a 24-in. Telsmith apron feeder to a Symons vibrating screen that removes 1½-in. minus material from the incoming product. All material retained on the screen then goes directly to a 28-in. Traylor gyratory crusher that reduces the rock to 1½ inches in size. From there it passes to a 5x10-ft. Tyrock screen with a ⅜-in. square mesh. Fines passing this screen drop down to an ore storage floor with a capacity of 2,200 tons. Slusher facilities move the material out of this point.

Oversize particles retained on the ⅜-in. mesh deck pass into a 4-ft. Symons shorthead cone crusher arranged in closed circuit with the Tyrock screen. When material is reduced to ⅜-in. minus particles, it drops to the ore storage floor.

Replace Railroad

In the old days a narrow gauge railroad brought material down the steep, winding mountainside. Eventually the railroad became obsolete. It also had been classified as a common carrier and, as such, came under the regulations of the Interstate Commerce Commission, making its continued use impractical because of heavy taxes. For these and other reasons the railroad was replaced in 1923 by an aerial tramway nearly four miles long. The tramway has two tangent sections, separated by an angle point, terminating at the Southern Pacific's railhead on the shore of Keswick Reservoir at Matheson, Calif.

Principal features of this tramway are 92 carriers. Each weighs 500 pounds empty, 2,000 pounds loaded. The system can carry about 50 tons an hour. Track cables are 1⅜-in. diameter Tiger Brand on the load side and 1-in. Tiger Brand on the return line. Both traction ropes are ⅞-in., 6x19, IWRC of Seale construction.

Maintenance over the years has been so thorough that a major failure of the tramway's main components has never occurred. Cables are inspected regularly for signs of fatigue. Special attention is paid to latches, pintles and sheaves. Original wooden towers have been replaced with structural steel towers—designed and fabricated by Riblet Tramway Co.—resting on concrete. Since iron pyrite generates its own sulphuric acid when damp, it has been necessary to re-cover the carrier bottoms with 12-gauge stainless steel which reaches well up around the carriers. Stainless prevention also is used at points in the crushing plant where chutes and feeders are exposed to the corrosive effect of sulphuric acid. The tramway system is driven by a 75-hp Westinghouse motor through a Western gear reduction box.

The tramway terminus is at a point where the carriers are automatically dumped, then re-routed up the mountain. A recovery tunnel under the surge pile at the railhead puts ore in gondola cars for rail shipment 175 miles to the San Francisco Bay area. A special car puller was made by Yuba Manufacturing Co. to the mine's specifications. Loaded cars can be switched fast. The car puller works anywhere on 1,000 feet of track and can handle 10 fully loaded cars at one time.

Mountain Copper has an excellent preventive maintenance program. Thanks to a long mining history, it has a fully equipped machine shop which includes such items as lathes, heavy duty tools, welding facilities, steam cleaning equipment, motor repair tools and special engine repair equipment. The latest shop addition is a heavy equipment repair bay. Its roof is high enough so that even a big end-dump truck can be serviced with its bed in top hoist position.

The new repair bay also has a service floor protected by railroad rails that are set in the concrete slab flange side up. By using these steel pathways tractors can move into the shop for repairs without spalling the concrete floor. The shop has lubricating pits which permit Eu-

Continued on page 58

LOOKING FOR A SAFE BUY IN USED EQUIPMENT?

This sign identifies the *safest buy* in used equipment—a "Bonded Buy" offered by your Caterpillar Dealer. Safest because you get a Guarantee Bond of up to $10,000, assuring you of satisfactory performance of all parts when you make a "Bonded Buy" on any used Cat-built machine.

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BEST BUY IN NEW AND USED EQUIPMENT

News from the Field

Engine Institute Elects Officers

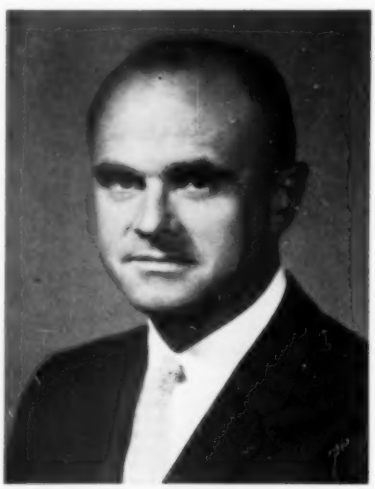
L. F. Shoemaker, Allis-Chalmers Mfg. Co., Milwaukee, Wis., was elected president of the Internal Combustion Engine Institute at its recent annual meeting. He succeeds F. C. Langston, Jr., of the P & H Diesel Engine Div., Harnischfeger Corp., who continues as a director.

Other officers of the institute for 1958 include A. D. Marks, Hercules Motors Corp., vice president; H. H. Howard, Caterpillar Tractor Co., treasurer; and James V. Doe, Willys Motors, Inc., secretary.

Elect T. M. Ware IMC President

International Minerals & Chemical Corp., Chicago, Ill., has elected Thomas M. Ware president. At 39 he is the fifth and youngest president of the 50-year-old corporation which is the world's largest producer of phosphate and a leader in the mining and processing of potash, feldspar and other industrial minerals.

He succeeds his father, Louis Ware, who was elected chairman of the board and chief executive officer.



Thomas M. Ware

Louis Ware

An engineering graduate of Cornell University, T. M. Ware began his engineering career in the aircraft industry and in World War II served as a staff officer in the Navy's office of research. He served briefly after the war as a management consultant engineer.

He joined IMC in 1947 as industrial engineer and in the next five years—a period of major company expansion—directed construction of new plant facilities and installations as chief engineer. Elected vice president of engineering, he planned, coordinated and directed a program that streamlined methods in IMC's 72 plants and mines throughout the country.

Since 1955, as administrative vice president, he has centralized and broadened the firm's staff services, including engineering, marketing, purchasing, traffic, mining and exploration. He was elected to the board of directors in 1957 and has had the additional responsibilities of the executive vice president since the retirement of James P. Margeson in June 1957.

Name District Engineer at Mobile, Ala.

Col. Robert W. Love has been named district engineer for the U. S. Army Corps of Engineers at Mobile, Ala. He will take his post in July.

Col. Love is a native of Madisonville, Tenn., and was commissioned in the Corps of Engineers in 1938 upon graduation from the U. S. Military Academy at West Point, N. Y. His first assignment was assistant to the district engineer at Memphis, Tenn.

During World War II he served in

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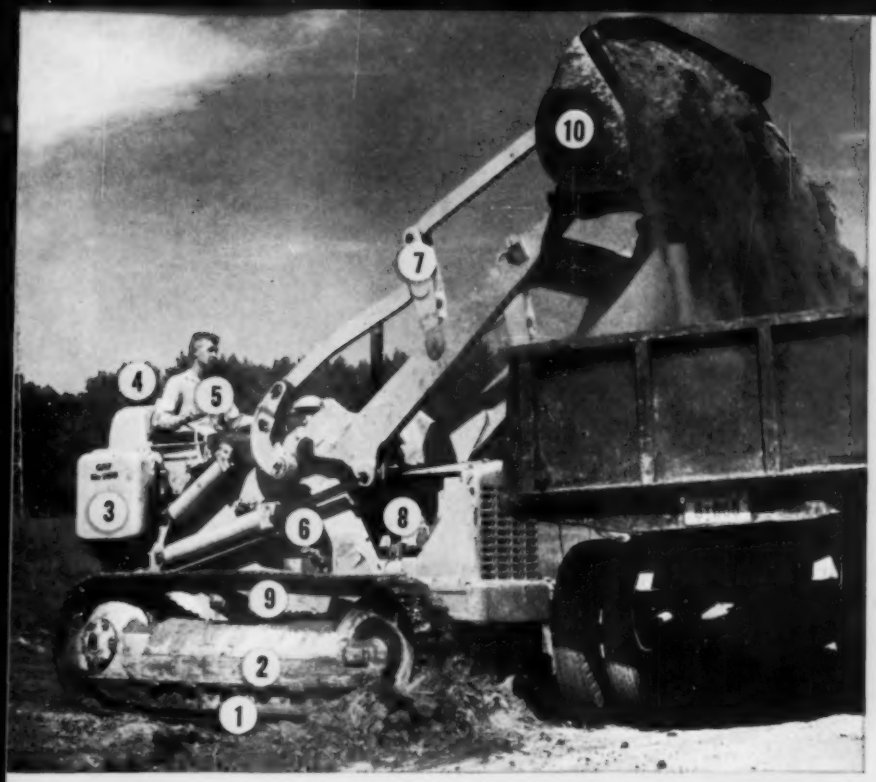
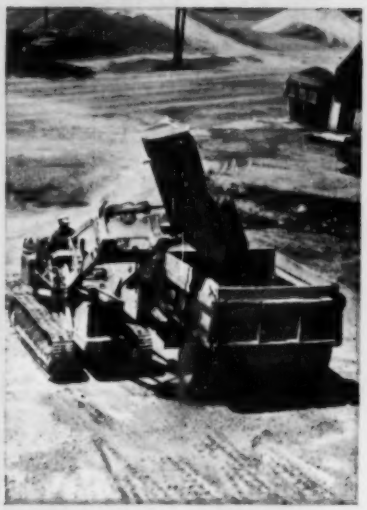


Caterpillar No. 955 Traxcavator works 10 hr. a day loading sandy loam into 6-yd. trucks for Brookings Excavating Co., Brookings, S. D. Two blocks of a street on the outskirts of town are being widened. Traxcavator is leveling bank. "One of the features we like best about it," says owner Lyle Stewart, "is the 40-degree tilt-back. It's especially useful tearing up old roads and sidewalks. You can get the bucket under a slab and use the tilt-back to tear up larger slabs at a time." This No. 955 is used for backfilling, too, and for digging basements, as well as for finish grading.



NOW AVAILABLE! NEW SIDE DUMP BUCKET!

Directly interchangeable with standard bucket . . . same pins, bolts, nuts. Easy to operate. Dumps to the left as well as forward. 1¼ cu. yd.

WHAT TO LOOK FOR WHEN YOUR CATERPILLAR DEALER DEMONSTRATES A No. 955 TRAXCAVATOR ON YOUR JOB

1. Notice the *triple-grouser* track shoes, designed specifically for this machine.
2. See the *5-roller track frame and larger idlers,* for better stability.
3. Check the *spool-type valves,* for smooth, positive bucket control.
4. Try the *padded seat made of foam rubber and raised* for good visibility.
5. Learn how convenient the *one-hand lift and bucket control levers* are.
6. Start the *all-weather gasoline starting engine*—so easy from the operator's seat.
7. Examine the *lift and bucket control arm linkage*—permits *40° tilt-back* at ground level.
8. Get the whole quality story behind the *CAT 70 HP Diesel Engine.*
9. Hear the amazing economy and convenience facts behind the *exclusive oil clutch.*
10. Watch the big 1½-*cu.-yd. bucket* in action (it's the widest part of the machine).

And this is *only the beginning* of your demonstration. Call your Caterpillar Dealer today.

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

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Designed primarily for handling sand and gravel, this new Press Dump Body features a 3 taper design which allows for greater load on the front end to take advantage of strict weight laws in various states. Press quality construction assures low maintenance cost — more yardage moved at lower cost. Get the facts today on Press Dump Bodies — Write for descriptive literature.
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News . . .

Continued from page 38

the Canal Zone, Australia, New Guinea and the Philippines. Other military assignments include duty as assistant chief of engineers for real estate in the office of the chief of engineers, Washington, D. C.; an industrial mobilization assignment with the Tennessee Valley Authority, Chattanooga, Tenn.; and engineer officer with the Japan Construction Agency.

He replaces Col. Harold E. Bisbort who has served as Mobile district engineer since December 1954. Col. Bisbort will receive an assignment in Europe.

Complete 1,286 Interstate Miles

Some 1,286 miles of the federal system of interstate and defense highways have been completed, according to a recent survey of state highway departments. The survey also shows approximately 3,143 interstate miles are now under construction.

The mileages represent actual facility miles, not project miles. The survey was conducted by dealers of Caterpillar Tractor Co., Peoria, Ill., who contacted individual state highway departments.

The completed mileage includes most of the 382 miles of roads which were built to interstate standards on interstate routes prior to June 1956, when the superhighway system was authorized. The 1,286-mile figure indicates highways open to traffic, but does not include those toll roads which are part of the system.

The Texas highway department reported the most completed interstate mileage—223. Other states leading in completed miles are: Pennsylvania, 118 miles; Washington, 140 miles; North Carolina, 144 miles; Maryland, 120

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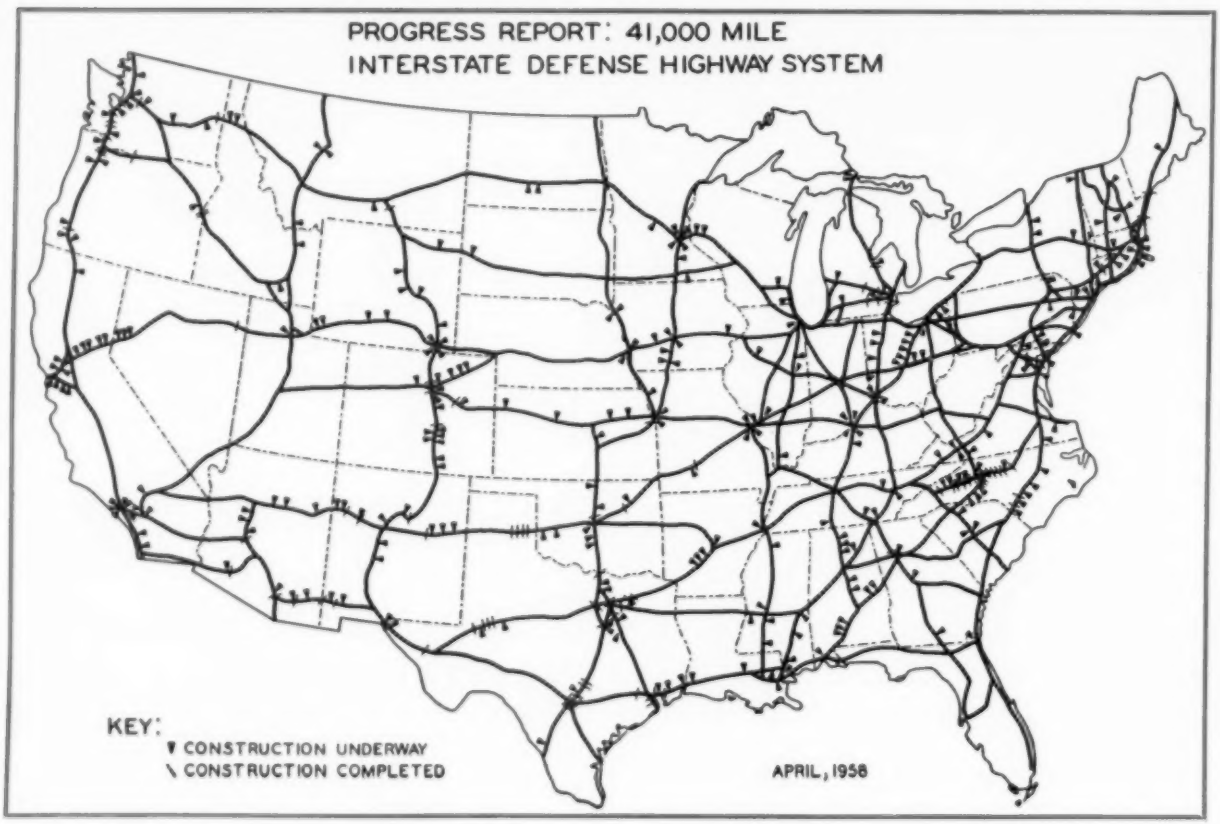

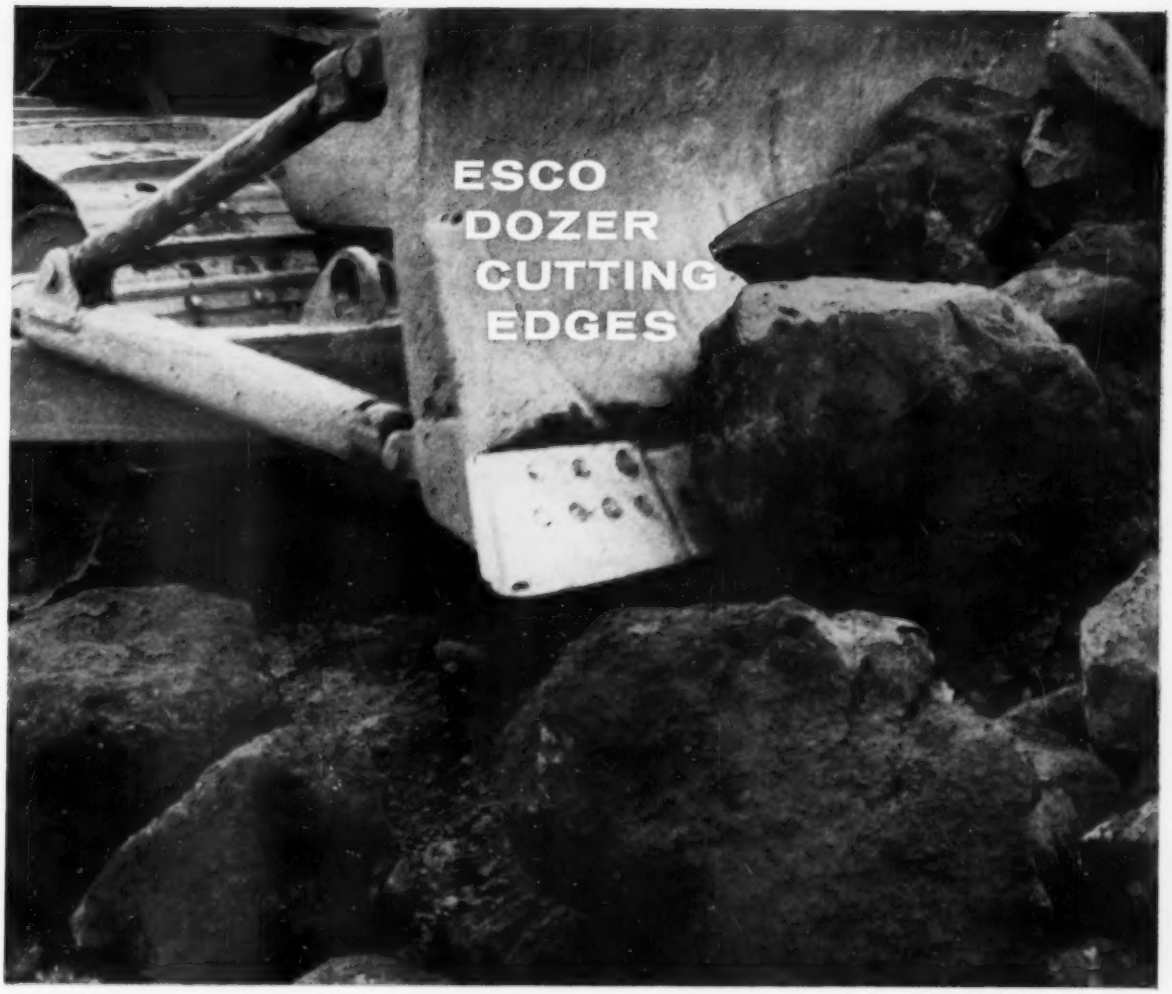

BUILT FOR BOULDER BUSTING BRUTES

Stop breakage problems on every kind of earthmoving job with tough, rugged *ESCO* Cast 12M Dozer Cutting Edges. *ESCO* Cast 12M Cutting Edges can take the severe punishment of longer pushes and rougher pioneering, even on the largest machines.

Careful heat treating of this *ESCO* steel alloy, 12M, makes *ESCO* Cutting Edges extra tough and hard *all the way through*. And, the same qualities that insure this breakage resistant toughness also impart amazingly high wear resistance.

You've really got the edge for low cost earthmoving and pioneering with *ESCO* Cast 12M Dozer Cutting Edges. Call your nearest *ESCO* dealer today for details.

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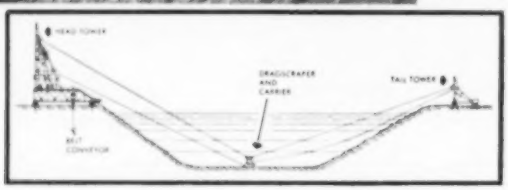
Tough Digging, Long Hauls... Routine Jobs for Sauerman DragScrapers

240-Ft. Bank... 350-Ft. Haul

This mobile Sauerman Tower Excavator digs 480 yds. per hr. on an average haul of 350 ft. from a high bank to a portable field hopper. The 12-yd. Crescent DragScraper operates between steel head and tail towers. The towers are mounted on two sets of railroad tracks and ride on four sets of trucks. DragScraper power is supplied by two hoists mounted on the head tower. One hoist operates the load and pullback cables, the other is used to tension the track cable. The hoists are controlled by one operator located in the cab on the tower. The load cable handles over 400,000 tons of material before replacement.



Drawing shows typical mobile tower excavator digging in wet pit.

75 Ft. Under Water... 800-Ft. Span

A 5-yd. rapid-shifting DragScraper supplies about 200 yds. per hr. to the plant hopper in background. Bridle tower in foreground is one of two supporting the bridle shifting cable which is controlled by the third drum of the Sauerman hoist. Lateral shifting of the DragScraper's line of operation is readily accomplished by power-shifting the trolley and tail block to a new position on the bridle cable. The DragScraper is digging 75 ft. under water and the operating span is 800 ft. from head frame to the bridle towers. Over a million tons have been excavated from this pit. The DragScraper often operates 24 hrs. a day to handle contract demands.

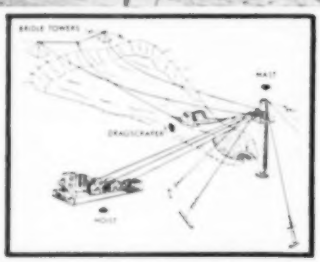


Diagram shows details of Sauerman rapid-shifting DragScraper.

Sauerman machines dig and haul in one continuous operation . . . work on high bank, dry pit or under water . . handle most bulk materials. Consult Sauerman engineers about your job. We will promptly supply appropriate literature.

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LInden 4-4892 • Cable CABEX—Bellwood, Illinois

Crescent Scrapers • Slackline and Tautline Cableways • Durolite Blocks

News . . .

Continued from page 40

miles; Michigan, 80 miles; and Oregon, 91 miles.

New York, California, Ohio, Rhode Island, Illinois, Wyoming, New Mexico, Minnesota, Mississippi, Missouri and Colorado are also among the leaders in utilization of available federal funds.

Some 65 cents of every dollar for interstate roads have gone into preliminary engineering, right of way and other steps prior to the awarding of contracts. On state, county and urban roads 93 cents of every dollar go into actual construction, with seven cents going for preliminaries.

The percentage of funds going to preliminaries on interstate roads is expected to decrease this year, with more money going to actual construction. Motorists should be traveling on many more miles of interstate roads by the end of this construction season.

Bill to Liberalize Depreciation Allowances

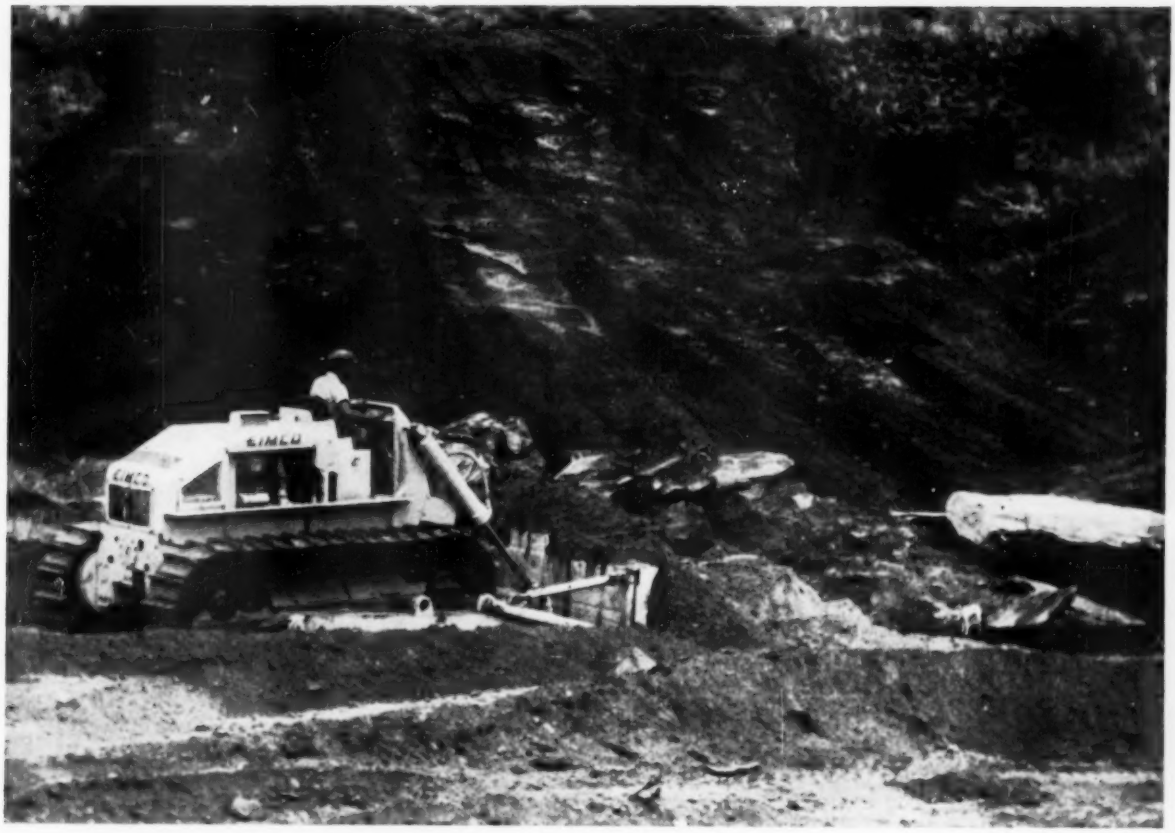
A bill whose major objective is to encourage contractors to purchase new construction equipment was introduced recently in the United States Senate by Senator Homer Capehart (Rep.-Ind.)

Under the terms of the bill (S-3718), most kinds of equipment purchased or contracted for during the 18 months beginning Jan. 1, 1958, could be depreciated in one-half the normally permitted depreciation period. This tax benefit is proposed as a sales incentive to potential equipment purchasers.

Of even greater significance, according to construction industry spokesmen, the extension of this accelerated depreciation allowance for many kinds of new construction, begun in the contemplated 18-month period, may stimulate another surge in capital expenditures for industrial plants, office buildings and other capital improvements. Industrial construction which has been declining for several months presumably would be given a new outlook, thus reviving this market for contractors and manufacturers.

In introducing the measure Senator Capehart said: "I am convinced that no other measure here proposed or under committee consideration will do the all-important job of creating jobs as quickly, as surely and as smoothly as will this bill."

A number of other senators and congressmen in key positions have indicated they will support the proposal.



TOMORROWS BULLDOZER–TODAY!

"THE BULLDOZER OF THE FUTURE" this is the way one Road Dept official described the Eimco 105 when he saw it operate on competitive tractor tests. Here, once again, the Eimco 105 Dozer has demonstrated superiority over conventional type tractors. In job after job, the 105 consistently proves that its simplicity of operation, smooth power flow, visibility, maneuverability and reduction in operator fatigue is the difference between marginal production and profitable production.

The work site consisted of a steep incline with rock outcropping in big slabs. The bottom ends of the rocks were deeply embedded and required maximum tractor effort to remove them.

Bulldozing down the slopes, the torque converter drive of the 105 enabled it to pick up a capacity load and move down the slope ahead of the competitive tractors with their outmoded conventional type drives.

Throughout the test – straight bulldozing, removing rocks and maneuvering – the 105 managed everything that came its way and did it with the least amount of operator effort. In direct contrast, the competitive tractor operators were constantly clutching, changing gears and braking to accomplish their tasks.

Eimco's Unidrive constant mesh transmission gives variable speed independent track control without clutching and shifting. Let us demonstrate this tractor.

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B 330

This Model 1250-B uses a 33-cu. yd. bucket on a 200-ft. boom in stripping operations at Hanover, Pennsylvania. Machine is owned by Pennweir Construction Company, a subsidiary of Weirton Construction Co., Weirton, Pa.

Here's Why Bucyrus-Erie Dragline Buckets

STRIP FASTER... LAST LONGER

Bucyrus-Erie dragline buckets are lighter and stronger because they are made with a specially-developed steel alloy called BECOLOY. It has a tough, fibrous structure that withstands shocks of great force . . . has high resistance to abrasion, high load-carrying strength!

BUCYRUS-ERIE buckets are balanced to carry loads smoothly without bobbing and spilling. Your operators can swing through each cycle faster to increase stripping production and profits.

Bucyrus-Erie buckets have BECOLOY in teeth, bucket lip, arch, clevis plate, and chains — the high wear parts of your dragline bucket!

FIND OUT NOW how you can increase both your production and profit with a new Bucyrus-Erie dragline bucket. They're available in light, medium, and heavy-duty types, solid or perforated. Call or write your nearest distributor today. Let him help you choose the right bucket to give your dragline extra output ability. Bucyrus-Erie Company, South Milwaukee, Wis.

50R58C

BECOLOY *makes the difference!* BUCYRUS ERIE

Equipment You Ought to Know About

11½-Yd. Scraper

Manufacturer: LeTourneau-Westinghouse Co., Department EE, Peoria, Ill.

Claims: LeTourneau-Westinghouse has added to its line an 11½-yd. scraper for use with tractors of 70 hp or more. The unit is designated as the DT Fullpak model.

Introduction of the DT model marks completion of the company's program to convert all of its tractor-drawn scraper models to the faster, easier loading Fullpak design. The 27-yd. BT and 18-yd. CT Fullpaks were both introduced in 1957.

Design features and operational characteristics of the new TD are the same as on the other Fullpak models. It has a clean smooth bowl interior to minimize resistance in loading and unloading. The bowl floor, which provides approximately 28 square feet of load base, measures only 40 inches from the tip edge of the cutting blade to the face of the tailgate, minimizing the distance material must travel to get into the bowl.

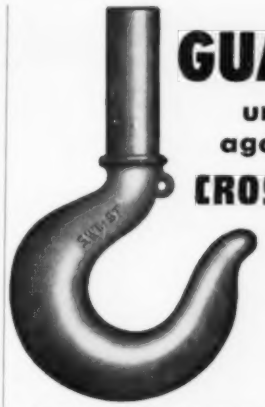
Cutting a broad swath, the DT's 8-ft. 4-in. three-section blade is angled precisely with the floor of the bowl to reduce loading resistance. With only a 1° floor tilt, the scraper bottom remains nearly flat in the loading position so material need not be forced "up-hill" to get into the bowl. The scraper's rear wheels are set well within blade width for maximum control in making accurate cuts.

To provide desired "live, rolling-boiling" action in the loading process, the DT features a precisely curved deflector plate and anti-spill grid on the top of the tailgate. According to LeTWesCo, the resulting "full boiling" of materials virtually eliminates voids and easily fills bowl corners and apron for extra heaping loads.

Loads come out as easily as they go into the unit. On the spread, the apron swings up to provide an opening a full 5 feet high for quick discharge. The tailgate is positive powered so that the bowl is wiped clean, even when handling the stickiest of materials.

The new scraper is extremely maneuverable. Although its overall length is nearly 29 feet, it requires less than 26 feet of space to make a complete 180° turn.

Standard tire equipment is listed as 16.00x20, 16-ply rating, tubeless tires with free rolling tread.



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unconditionally against breakage!
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HOOKS

Greater safe working loads—the highest guaranteed capacity *per size*—are offered by Crosby-Laughlin* "Load-Rated" Hooks. Proved design and new alloys—drop forged and heat treated—increase capacities by 50% with no increase in weight! This complete line gives you capacities from ¾ to 150 tons—is unconditionally guaranteed against breakage. Every "Load-Rated" hook with drilled cam converts quickly to a safety hook. Demand the "RED fittings," symbol of quality and the world's most complete line of drop forged fittings. *New catalog* has detailed specifications on over 2000 items. Available from construction, industrial and mill supply distributors. Or write:
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CROSBY-LAUGHLIN *Division*
AMERICAN HOIST & DERRICK COMPANY
FT. WAYNE 1, INDIANA

Wire Rope Design

Manufacturer: John A. Roebling's Sons Corp., Department EE, Trenton, N. J.

Claims: Herringbone wire rope, a new construction which combines the flexibility and abrasion-resistant characteristics of Lang lay rope with the structural stability of regular lay, has been developed by Roebling.

The wires in regular lay rope are laid in a direction opposite to that of the strands in the finished rope, while the wires in Lang lay rope follow the same direction as the finished strands. Herringbone rope is fabricated of two pairs of Lang lay strands separated by two strands of regular lay.

The tough and relatively large outer wires will withstand the friction resulting from continued contact with sheaves, drums and other external objects, while the smaller and highly flexibile inner strands enable herringbone to sustain the most severe bending stresses.

The new rope was field-tested during a three-year period on such applications as general hoisting, holding and closing lines, shovel ropes, wagon scraper ropes and dragline ropes.

Herringbone ropes are made exclusively of type 1105 wire developed by Roebling. They are of the 6 x 37 classification, are preformed and are 15% stronger than improved plow steel ropes.

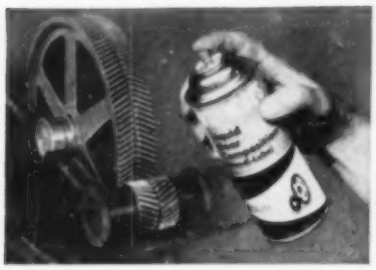
"Down-the-Hole" Drill

Manufacturer: Ingersoll-Rand Co., Department EE, 11 Broadway, New York 4, N. Y.

Claims: Ingersoll-Rand has announced an important design change to the Depthmaster "down-the-hole" drill which it introduced in 1955. The

TRIAL SAMPLES

Of World-Famous WHITMORE'S Lubricants NOW IN AEROSOL SPRAY-ON CANS!



HANDI-LUBE LIQUID GEAR COMPOSITION

For open gears, sliding surfaces—exclusive formulas eliminate metal to metal contact, keep wear on the lubricant not the metal—no breakdown even after prolonged use under water—available for every climatic condition—packaged in handy 16-oz. aerosol spray-on containers or in bulk containers—send for a free trial sample.

WIRE ROPE SPRAY LUBRICANT

Exclusive formulas for lubricating and protecting wire rope, chain, springs. Penetrates to the core of wire rope minimizing internal friction and increasing usable life up to 300%—special protective qualities absolutely eliminate corrosion—non-gumming qualities reduce "carry-back"—packaged in handy 16 oz. aerosol spray-on containers or in bulk containers—send for a free trial sample.

65 YEARS OF LEADERSHIP LUBRICATING THE FOLLOWING:

- Open Gears, Dipper Sticks, Cams
- Enclosed Gear Cases
- Wire Rope and Cable
- Hydraulic Units, Torque Converters
- Roller, Ball, and Sleeve Bearings
- Speed Reducers

Est. 1893

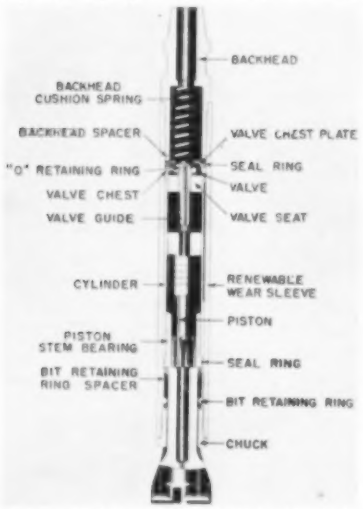
THE WHITMORE MANUFACTURING CO.

LUBRICATING ENGINEERS

CLEVELAND 4, OHIO, U.S.A. PHONE: VULCAN 3-7272

change provides continuous hole cleaning air even when the drill is not in operation.

Continuous high pressure hole cleaning air continues to pass through the drill and the bit after drilling is interrupted, keeping the hole clean and minimizing sticking of the drill in the hole. This feature also prolongs drill life.



All operating air is exhausted through the bit; therefore all the air is used for hole cleaning.

This patented feature eliminates the need for special exhaust ports in the side walls of the cylinder which can let harmful cuttings into the drill.

The Depthmaster down-the-hole drill is manufactured in three sizes for blast holes from 4¼ inches to 7 inches. The manufacturer also states that the drill is available to users of other drilling equipment.

Improved Crawler Tractor

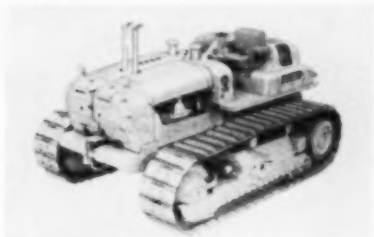
Manufacturer: Euclid Div., Department EE, General Motors Corp., Cleveland 17, Ohio.

Claims: Major improvements in the model TC-12 crawler tractor have been announced by Euclid. This "Twin" crawler features 402 net hp delivered to the power train; two Torqmatic drives with independent planetary track drives; no steering clutches; 8-roller track frames; rear-mounted cooling system; in-seat starting; fully automatic hydraulic track recoil adjustment; and unitized assemblies.

As a result of heavier construction and more rugged components throughout, the bare weight of the tractor has been increased from 64,000 to 67,000 pounds plus. Design improvements have also resulted in longer wearing components, in greater accessibility of many components for faster, easier servicing and in better overall operation.

In the track system, changes include longer lasting sprockets, improved lubricated idlers, more durable track shoes, wider self-cleaning links and more clearance where beneficial.

Mounting of components and accessories is simplified with more trouble-free life built into newly designed elements. Vibration has been minimized and wearability increased by improvements in components such as drawbar, hood hold-downs, oscillation stops and belly guards and shrouds.



Typical of improvements on engine and accessories are the strengthening of engine and filter mountings to prevent fatiguing and the replacement of four oil bath air cleaners with two dry-type cleaners.

Transmission and drive modifications provide longer life and simplified servicing through more effective lubrication, improved wearing surfaces and readily accessible location of key components.

An increase of 30% in the mechanical advantages of brakes has been made in the TC-12 crawler.

Additional refinements in electrical system installation, cooling system, transmission controls and construction assure easier operation, easier servicing and more reliability.

Truck Loader

Manufacturer: M-B Corp., Department EE, New Holstein, Wis.

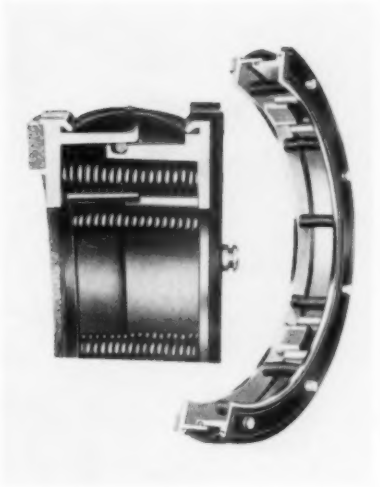
Claims: A heavy-duty M-B truck loader has a self-loading bucket incorporating a hydraulically operated jaw. The jaw swings down and reaches out to meet ground level approximately 13

inches forward of the lip of the bucket. Smoothly completing its closing cycle, the jaw pulls in and holds the "full load" bite in the ½-yd. bucket.

The powerful jaw action of the self-loading bucket eliminates the necessity of ramming the truck into a stockpile to obtain a full bucket. Consequently, there are no shock loads on the truck, its frame or the loader mechanism. When picking up small piles, the jaw fills the bucket quickly, easily and completely without "chasing" the material along the street and without using additional men to sweep or shovel into the bucket.

The MB loader is designed to fit almost all types of trucks, including four-wheel drive units, cab-over, tilt cab and conventional trucks, without violating legal overall truck width restrictions. The heavy-duty bucket has a ½-yd. capacity and larger buckets are available for special jobs.

Final Drive Seal



Manufacturer: Sure-Seal Equipment Co., Department EE, 1820 N. W. 25th Ave., Portland 10, Ore.

Claims: An improved lubricant seal for the final drive on Caterpillar D-9 tractors is available. Called Sure-Seal, it offers double protection against lubricant loss from the final drive. There is an inner seal consisting of a rubber O-ring which rides between metal flanges, as well as the conventional outer rubber bellows seal.

This inner seal retains lubricant even though the outer bellows seal is ruptured. Sure-Seal also prevents dirt and water from entering the final drive.

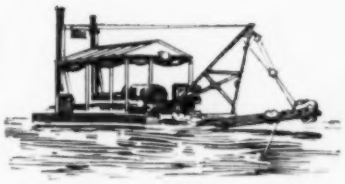
Other features are rubber grommets on the locating pins which hold the seal in position during installation; flexible, oil-resistant bellow which is rubbed for extra strength; and equal pressure springs which exert just enough pressure to give a good seal without causing excess friction.

Seals are also available for other tractor models.

ELLICOTT DRAGONS*

insure low-cost operation, in moving waterbound solids.

Ellicott "DRAGON" 10—Easily assembled, pumps mud, silt, sand and gravel through pipelines up to 2500 feet long; capacity 90-325 cubic yards per hour.



Ellicott "DRAGON" 8 — Capacity 60-150 cu. yds. per hr. through pipeline up to 2000 ft. long. "Dragons" available with enclosed or tropical deck house, as shown.

Ellicott "Dragon" model dredges recognized the world over for efficiency, economy, versatility and portability . . . offer engineers, builders, contractors, the cheapest method of moving waterbound solids. And do it with the efficiency and economy possible only with a hydraulic dredge. Ellicott can supply you with a full line of spare parts and auxiliary equipment, plus expert engineering service. Write for free Bulletin No. 925.

*T. M. REG. U. S. PAT OFF. MARQUE DÉPOSÉE

ELLICOTT MACHINE CORPORATION

1619 Bush Street, Baltimore 30, Maryland, U. S. A.

Subsidiaries: Dragues Ellicott France, Paris, France; Ellicott de Mexico, Mexico City, Mex.; Ellicott Fabricators, Inc., Baltimore, Md.; McConway & Torley Corp., Pittsburgh, Pa.; Baltimore Foundry & Machine Corp., Baltimore, Md.

Successors to the floating dredge business of the Bucyrus-Erie Co. and the American Steel Dredge Co. Complete engineering sales and repair parts service. 1144

Engine Hour Meter

Manufacturer: John W. Hobbs Div., Department EE, Stewart-Warner Corp., 1826 Diversey Pkwy., Chicago 14, Ill.

Claims: A new explosion-proof hour meter, specifically designed for use in hazardous locations such as mines and fuel depots has been developed by Hobbs. The meter can be used on gasoline or diesel engines, fork lift trucks, generators and air compressors.

Available for 12 and 32-volt DC applications, the precision-built, true-timing instrument is housed in a specially designed, explosion-proof case which is approved by Underwriter's Laboratories under Class 1, Group D specifications.

The Hobbs hour meter tells at a

Continued on page 52

One of the eight Mack four-wheel dumpers with 22½ ton capacity operated by Goodfellow Bros., Inc., of Wenatchee, Washington. The Macks have proved so valuable that Goodfellow Bros. have four more on order. These heavy-duty haulers are taking on a . . .

punishing road job in

Even in temperatures ranging from —15° to 110°, through mud, extreme dust, snow and ice, and on grades of up to 23%—Goodfellow Bros. know that their Macks will perform efficiently, dependably . . . and profitably.

Under such grueling operating conditions, their Mack dumpers showed their capability on the 3,000,000-yard Rocky Reach Dam earth-moving project on the Columbia River. Then they double-proved it on the Snoqualmie Pass highway construction in Washington's rough mountain country.

Besides providing maximum payloads at minimum hauling costs, the Macks are particularly well accepted by Goodfellow Bros: drivers and shop personnel because of their handling ease, short turning radius and easy accessibility for servicing.

Dumping rock on a road-widening operation on Highway #10 in Washington's Cascade Mountains. Prior to this road job, Goodfellow's 22½ ton Macks were used in the 3,000,000 yd. excavation and backfill for the Rocky Reach Dam near Wenatchee, Washington.

Snoqualmie Pass

There is a Mack tailored to your construction needs that will provide large-capacity payloads at minimum unit cost. Let your Mack representative show you on-the-job performance proof that—under today's conditions—you can't afford *not* to operate Macks! Mack Trucks, Inc., Plainfield, New Jersey. In Canada: Mack Trucks of Canada, Ltd.

MACK

first name for

TRUCKS

5601

NOT in the Contract

Hungry customer at lunch counter: "One roast beef sandwich."

Waiter: "Will you eat it here or take it with you?"

Customer: "I hope to do both."

Turning to her daddy, seven-year-old Barbara asked, "Why doesn't Tommy talk?"

"He can't," replied the father. "Babies as small as he never do."

"Oh, yes, they do," Barbara reassured him. "Why, at Sunday School last week teacher told us that Job cursed the day he was born."

The sexy red-head lowered herself gingerly into the dentist's chair and steeled herself for the coming ordeal. But to her surprise, the dentist apologetically explained that he was out of gas. She leaped to her feet, screaming, "For goodness sakes, do you dentists pull that line, too?"

Speaker: "I have lived in this town all my life. By actual count, there are 35 saloons in the town, and I am proud to say I have never been in one of them."

Voice: "Which one is that?"

A fellow dining in a restaurant missed the potatoes and thought he would try out his French on the pert waitress. So he said: "Where's the pommes des terres?"

Blinking not an eye, she retorted: "First door around the corner to the left."

He: "No woman ever made me look stupid."

She: "Who did then?"

"Hey you! We haven't diverted the course of the river yet!"

A man who moved into a well-to-do but stuffy neighborhood was mowing his lawn one hot day with his shirt off. After several minutes had passed a patrol car pulled over to the curb and the cop walked over to the man.

"Don't you know you're breaking the law?" the cop growled. "We don't permit indecent exposure in this town."

The man, convinced he was acting perfectly innocently, shrugged his shoulders.

This exasperated the cop.

"Why, what would people say if your wife mowed the lawn dressed like that?" the cop asked.

"They'd say I married her for her money," the man replied.

"Dad," asked the small boy, "why is a man allowed to have only one wife?"

"My son," replied the father, "when you are older you will realize that the law protects those incapable of protecting themselves."

One of the greatest marksmen of the FBI was passing through a small town, and everywhere he saw evidences of the most amazing shooting. On trees, on walls and on fences there were numberless bull's-eyes with the bullet hole in the absolute center.

He asked to meet the person responsible for this remarkable feat. The man turned out to be the village idiot.

"This is the most wonderful marksmanship I have ever seen," said the FBI man. "How in the world do you do it?"

"Easy as pie," replied the village idiot. "I shoot first and draw the circle afterward."

Do you know a definition of a red head?—A communist outhouse.

Golfer (to member ahead): "Pardon, but would you mind if I played through? I've just heard that my wife has been taken seriously ill."

Two camera bugs were draped over a Paris bar discussing their experiences. "This morning I saw an old crone huddled beneath a bundle of rags," one said. "She was hungry and homeless. She told me that she was once a countess but lost her family and money and now was a wretched old woman with nothing to live for."

"The poor thing," said the other photographer. "What did you give her?"

"Well, it was sunny," the first replied, "so I gave her f11 at 1/100."

Cat No. 12 Motor Graders!

BEST BUY FOR 20 YEARS—BEST BUY TODAY!

Here's why: When the No. 12 was introduced in 1938, it set new performance standards to become the leader in this type of equipment. Today it *still* is the leader, because Caterpillar has constantly built improvements into it.

Shown here are *some* of the many changes that have been made in the No. 12 to keep it the unquestioned leader. Its exceptional dependability and high resale value are common knowledge. Dollar for dollar, the No. 12 is the most valuable motor grader that you can own.

Compare today's No. 12 with any other motor grader—compare it with older No. 12s, too. By any measure you'll find it has grown in work ability, matched to meet today's exacting construction and road maintenance needs. For complete information about this modern, heavy-duty machine, see your Caterpillar Dealer!

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

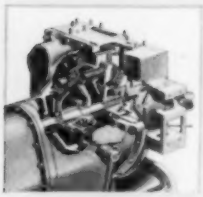
FIND YOUR CATERPILLAR DEALER IN THE YELLOW PAGES

CATERPILLAR

Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

NO. 12 MOTOR GRADERS—BEST BUY BY ANY YARDSTICK!

Longer main frame adds extra clearance between the toe of the blade and the front tire for all blade positions. There's ample blade maneuvering space whether the No. 12 is equipped with 13.00-24 or 14.00-24 front tires. Curved side shift rack permits fast, easy blade positioning—all common blade positions are available to the operator without leaving the cab.



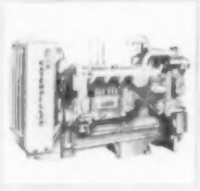
Exclusive oil clutch, the most advanced clutch design ever offered in a motor grader, provides up to 2,000 hours without adjustment. This is equivalent to about 12 months of "adjustment-free" operation. And because wear rate of clutch facings is so slight, down time for clutch repair is virtually eliminated. The oil clutch accounts for a large part of the No. 12's reputation of dependability.

Unequalled visibility results from the No. 12's dash-mounted lift gears and low frame design. While seated, the operator has an unobstructed view of the critical areas at the front wheels, toe of the blade and circle. In-cab starting and easy-to-reach controls are other No. 12 features that help the operator work more efficiently.

Optional Preco Automatic Blade Control, available only on Cat Motor Graders, controls blade slope to an accuracy of within ¾" in 10', regardless of position of grader. Operator merely dials the required slope on the control, then follows the guide lines. Preco-equipped No. 12s cut conventional grading time as much as 50%.

Improved service life is built into the No. 12 with larger king pins and bushings, larger inboard spindle bearing, new steering arm pivot block with seals, improved steering booster with outboard bearing. No other motor grader can surpass the No. 12 for rugged construction—another important factor in the machine's dependability story.

Mechanical controls, standard on the No. 12, offer positive action, make blade adjustments precise. Powered right from the engine, they give a speed and range of blade movements no other unit can match. More than one lever can be operated at a time, without slowing blade movement. "Anti-creep" braking mechanism makes the blade "stay put" while under load.



Modern heavy-duty Cat No. 12 Engine features, among other advantages, the exclusive Caterpillar fuel injection system. This permits the use of economy-type fuels without fouling. The long-life reputation of Cat Diesels is well known—no other engine can match them for dependability!

New Equipment . . .

Continued from page 47

glance the actual hours and minutes of engine operation so that lubrication, oil and filter change, overhaul, inspection, cost of specific jobs, and fuel and oil

consumption can be planned and recorded. Electrically-wound, the Hobbs hour meter accurately records hours and tenths on a quick reading odometer.

Materials Transporter

Manufacturer: Chain Belt Co., Department EE, 4701 W. Greenfield Ave., Milwaukee 14, Wis.

Claims: An improved, heavier-duty Railporter is now offered by Chain Belt. The new model is a portable self-propelled materials handler that transports concrete and other construction materials over an easily set up monorail system.

It makes its round trips from supply point to destination unattended, even stopping automatically.

Compact in design, the Railporter has a large capacity. The power unit and the trailer unit carry a 29.2-cu. ft. liquid-level capacity; 20 cubic feet of concrete; or 3,000 pounds of blocks, bricks, stone or lumber. The 12-ft. rail sections can be set up at the rate of 450 feet of track per hour with a three-man crew. Additions to the tracks as the job progresses—or the adding of curves and switches to meet any job location needs—are easily made.

The new model has greater strength at every stress and working point. Larger bearings are used in the outboard roller. Double-shoe brakes have been added. The stop plugs, which are rail-inserted for automatic halting of the unit, are heat treated for extra long service life. A new alloy steel drive wheel is now used. Controls are further simplified. A new rail stand is introduced also. This is a non-adjustable type for use on deck work. An improved adjustable stand is also offered for quick set-ups on uneven ground.

The Railporter now features fully enclosed design with the engine housed inside a smart, functionally styled steel housing. Much greater accessibility is offered by the design. The standard V-drive belts which provide tractive power can be replaced in minutes without any disassembly.

Rotary Drill Hammer

Manufacturer: Demo-Haines Tool Corp., Department EE, Darco Industries, 2151 E. Rosecrans Ave., El Segundo, Calif.

Claims: A series of new, exceptionally low-priced portable rotary hammers is now being produced by Demo-Haines Tool Corp. The air, gas and electric-powered models are about $\frac{2}{3}$ the weight of conventional hammers of equal performance ratings.

Utilizing a unique rotary shock wave principle, the hammers are built for vertical, horizontal or overhead drilling and are capable of producing long or short holes ½ thru 8-in. diameter.

Features include built-in air or water swivel; self-cleaning holes; interchangeable adapters and core bits with all models; and a hole-in guide that prevents "walking" and "wobble."

Five models of rotary hammers are designed to cover a wide working range in the fields of general contracting, sheet metal and construction, as well as mining and over-all slug-in drilling. The DE-600 heavy-duty model is shown.

"His handicap is definitely an asset on this job!"

Parts Cleaner

Manufacturer: Gumout Div., Department EE, Pennsylvania Refining Co., 2666 Lisbon Rd., Cleveland 4, Ohio.

Claims: A triple-action parts cleaner has been developed after more than two years of research by the Gumout Div., Pennsylvania Refining Co. Named S-P-D parts cleaner, it combines solvent, penetrant and detergent action for the greatest possible speed in cleaning of all types of metal parts.

The solvent action dissolves and completely removes accumulations of gum varnish, oil and grease. The penetrant

action pieces and lifts the hard, caked-on deposits. The detergent action quickly floats away the common dirt, soil and grime.

Other features include minimum odor that "doesn't go home with you"; long effective life; and a hydro-seal layer that prevents evaporation. The cleaner will not rust, corrode or leak out of the container. It is non-explosive and non-inflammable.

S-P-D cleaner is packaged in 5-gallon steel pails containing four gallons of cleaner.

It's the handiest, most economical power-producing package in its class

...ANYWHERE

NEW 35-kw generator set from Allis-Chalmers

You Can TAKE It Anywhere — One compact, integral unit — engine, generator and switchboard. Only 68 x 25 x 37 in. over-all. Fits easily into a pickup truck or slides from place to place on steel skids. Runs on gasoline or gas.

You Can WORK It Anywhere — indoors or out. Engine is fully protected from snow, dust or rain — generator is weatherproof. Switchboard is cabinet-enclosed to guard against weather, dust, tampering. Set needs no special skill to operate—just connect the load.

You Can SERVICE It Anywhere — It's easy to service this simple, tractor-rugged engine. Even when a complete overhaul becomes necessary, its "wet" removable cylinder liners are low-cost and quickly replaced. What's more, you are never far from a source of original Allis-Chalmers parts.

But You CAN'T MATCH ITS VALUE — ANYWHERE — Compare in on any basis you choose — low invested cost per kilowatt, high economy per kilowatt produced and greatest engine life per dollar. This set has a heavy-duty engine specially built to operate long hours in the steady grind of generator work.

...the G-226 POWER PACKAGE

ENGINE:
Allis-Chalmers industrial POWER-CRATER engine
60 bhp at 1,800 rpm

GENERATOR:
3-phase, AC current, 35 kw
Single phase, 23 kw

DIMENSIONS:
68 in. long,
25 in. wide, 27 in. high

WEIGHT:
1,645 lb

A PREMIUM SET AT ECONOMICAL COST!

POWER-CRATER is an Allis-Chalmers trademark.

Let your Allis-Chalmers dealer explain the many other reasons why the new G-226 is the best buy in its class — anywhere. Send for Bulletin BU-412. No obligation. Allis-Chalmers, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

BG-27

Running the Boyle-Ryan operation keeps Project Manager Mason Travis busy. He recently managed construction of the powerhouse and switchyard at Fort Randall Dam.

Tollway . . .

Continued from page 26

tion. A cubic foot of clay averaged 115 pounds in weight. To keep the pits dewatered a number of 2 to 8-in. sump pumps were operated constantly.

When *Excavating Engineer* visited the job, the truck fleet was running on a mile-long haul from the borrow pit to a fill area near US 20. Chris Sogge, superintendent for Boyle-Ryan, explained why trucking, which was comparatively more expensive than scraper hauling, was necessary.

"I couldn't close a busy highway like US 20 to let crawler equipment through without creating traffic jams," he said. "Even so our flagmen had to stay on their toes every minute."

Sogge, who is general superintendent of all Boyle's construction activity in the Chicago area (and a veteran of 30 years service with the firm), is a hard man to find on the job when the weather is dry. "This job is so spread out one man can hardly follow it all," he remarked. "With the traffic and the fact this job is split in half by another contractor's bridge section (a $2.2 million viaduct across a freight yard built by Lee Construction Co., Chicago), it's a wonder we get anything done."

Under Sogge's experienced eye, however, the job was proceeding smoothly. When the weather was right, the combined scraper-bellydump-truck fleets have placed about 25,000 yards of embankment per shift for a weekly total of 180,000 yards. Two 10-hour shifts worked seven days a week. As many as 500 men were employed.

Built 8-in. Lifts

As borrow was end-dumped on the Tri-State roadway by trucks, Caterpillar D8 dozers and Allis-Chalmers HD-16's spread and leveled the material. The fill was laid down in sections running about 2,000 feet in length; each lift was a maximum of 8 inches deep.

Compaction to the 95% proctor density required by specifications required an exceptionally high amount of discing and rolling to dry out the excess liquid. Used for this purpose were Rome disc harrows and Ferguson sheepsfoot rollers hooked up in tandem. Four such tamping units had a working weight of about 75,000 pounds and were drawn by a single tractor.

An embankment width of about 160 feet is maintained in Boyle-Ryan's section T-7A, which will have six traffic lanes plus safety shoulders and a 50-ft. dividing median. A 10-in. layer of select subbase material and a 4-in. compacted sub-base of granular material is being placed on top of the embankment. Approximately 400,000 square yards of 10-in. pavement are to be laid. Paving operations began in May.

The presence of highways and railroads in the path of the right-of-way requires five structures, four of which are prestressed concrete and one steel. Little excavation—about 15,000 cubic yards—was needed for structures because their foundations were placed on metal piles driven into the clay subsoil strata with pile hammers and filled with concrete.

Structural quantities are 40,000 linear feet of pile shells; 16,000 yards of concrete; 4½ million pounds of reinforcing steel; 2.8 million pounds of structural steel; and 7,200 linear feet of prestressed concrete bridge girders and beams.

Crane-excavator equipment on the job varied from time to time as machines were pulled off to work on other Boyle jobs in the county—including excavation for a depressed section of the Congress Street expressway in Oak Park. It was not unusual for a dozen Bucyrus-Erie machines ranging from ¾ to 2½-yd. size to be working on the Boyle-Ryan section simultaneously. A 35-ton and a 25-ton Lorain Moto-Cranes were assigned to the job.

Structural concrete was supplied from transit-mix trucks by Material Service Corp. Concrete for paving operations is coming from Boyle-Ryan's own automatic batch plant. The Blaw-Knox plant was layed out and erected with the cooperation of the D. D. Kennedy Co., Bellwood. The plant is geared to turn out 1,483 batches of 1.385 yards of concrete in an 8-hour day. This sup-

(Left) Fill dumped by semi is spread by dozer. (Right) Heavy sheepsfoot tampers drawn by a Cat D8 compact the soft, wet clay.

ply keeps busy two Multifoote 34-E drum pavers. All batching is pushbutton controlled. Cement, sand and aggregates are weighed electronically and chuted into trucks for delivery to the pavers.

Project manager for Boyle-Ryan is Mason Travis, who has seen 12 years service with Boyle. The most recent major project he has managed was the powerhouse and electrical switchyard phases of Fort Randall Dam at Pickstown, S. D.

Supervising the maintenance setup for the contractor is Ray Brindley, master mechanic.

M. J. Boyle & Co. headed by Malcolm J. Boyle, president, is one of Chicago's best known names in contracting. Among the highway projects on which it has worked are the Edens Expressway; Calumet Skyway; and the Northwest Expressway.

Ryan Construction Co. is headed by Mike Ryan, president. Some big jobs it has recently worked on include Aluminum Company of America's power plant and smelter on the Ohio River near Evansville, Ind., and the construction of the Indiana toll road.

Supervising engineers for contract section T-7A is the Chicago firm of Naess, Murphy, Beiswenger & Hoch. Edwin Plawin is resident engineer.

Joseph K. Knoerle & Associates, Inc., is the consulting engineer firm for the overall Illinois toll highway project. Twenty-three contracting engineer organizations complete the vast lineup of engineering talent behind the construction program.

The chairman of the Illinois toll highway commission is Austin L. Wyman.

Artist's conception shows tri-level interchange. Tri-State road is on top level and East-West on intermediate. Lower level allows traffic to change from one to other.

Charles L. Dearing is executive director and George L. Jackson is chief engineer.

The big job for contractors to lick this summer is the Tri-State tollway. The route is not only much longer than the other two tollways, but the construction problems are complex.

For instance, the longest bridge of the entire project will be twin 4,935-ft. long spans across the Des Plaines River, Chicago Sanitary & Ship canal and the mainline stems of several railroads south of La Grange.

West of Oak Park, the Tri-State crosses one of the world's largest freight yards—the Bensenville yards of the Chicago, Milwaukee, St. Paul & Pacific railroad. An elevated structure spans some 54 tracks. Also to be crossed are the Markham yards of the Illinois Central; the Proviso yards of the Chicago & Northwestern; and the Fairview yards of the Soo line.

The project's two largest interchanges will also be built on the Tri-State. Both are tri-level structures. This design provides considerably greater traffic capacity than a conventional cloverleaf and will permit a rapid flow of traffic in all directions.

One tri-level will connect the Tri-State with the East-West tollway. Costing over $23 million with appurtenant roadways within the contract limits, it is the most expensive piece of highway ever put in place in the state of Illinois. A joint venture of four firms—Western-Boyle-Healy-Ryan—is responsible for the work.

The second tri-level will connect the Tri-State with the Northwest tollway near O'Hare International airport. Its price tag is $12 million, including $3.8 million worth of necessary fills and 21,000 linear feet of prestressed concrete girders. Contractor here is a group composed of S. J. Groves & Sons, Inc., Springfield, Ill.; Arcole Midwest Corp., Evanston, Ill.; and L. B. Strandberg & Sons Co., Inc., Chicago.

A 63-ft. concrete girder weighing 30 tons is erected by a 54-B and 38-B at Irving Park Road. Telescoping Kentucky trailer pulled by an International R-190 truck hauls girder.

Next month's issue will feature a photo-article about construction of the biggest structure of the Illinois toll highway—the mile-long Des Plaines River bridge.

BUCYRUS-ERIE ROTARIES BRING NEW

Drilling 9-in. holes at an open pit copper mine, this Bucyrus-Erie 40-R puts down five times as much footage as cable tool drills previously used. To speed progress at this location, the 40-R drills continuously for the full length of the drill pipe — 27 ft. 9 in. (The larger 50-R drills continuously for 32 ft. 9 in.)

In blast hole operations from coast to coast, Bucyrus-Erie rotaries have revolutionized drilling. The jobs pictured here are examples of the kind of performance owners everywhere get with Bucyrus-Erie rotaries. Check the job data carefully. See how important Bucyrus-Erie rotary features contribute to top output.

These advantages can speed *your* drilling progress, too. Write us today for illustrated bulletins on the 40-R (full-electric or diesel-electric power) for drilling 6¾ to 9-in. holes, and the 50-R (full-electric only) for drilling 9⅞ to 12¼-in. holes. 75858C

BUCYRUS ERIE

A Familiar Sign at Scenes of Progress

BUCYRUS-ERIE COMPANY
Drill Division
U.S. Highway 40 West, Box 324, Richmond, Indiana

In a Canadian open pit iron mine this 40-R is responsible for new drilling economy. When moved to this location, it cut drilling costs per foot of hole by more than 50%. One of the features that contribute to the 40-R's fine performance at this mine is air bailing of cuttings. Compressed air cools the bit and cleans out cuttings, eliminating the need for water — especially important during cold weather. Heavies pile up adjacent to the hole, provide handy stemming material, and permit dry sampling.

The first 50-R placed in operation at this open pit coal mine in Ohio increased drill footage so substantially that three other 50-Rs were added. Here and in softer formations, the operator can increase rotating speed substantially as he cuts down pressure. He can match pulldown force and rotation speed so tools do not advance faster than cuttings are removed. At the same time, he keeps up enough air velocity to remove cuttings from the hole.

DRILLING ECONOMY...

The 40-R shown here at a Pennsylvania quarry was brought in to drill difficult formations — quartzite segmented by fissures and seams. This rig improved footage so greatly that it was placed permanently at this location. When drilling these hard formations, the operator can exert maximum down pressure on the bit while the drill pipe is turning slowly. This gives greatest possible penetration.

TO QUARRIES

This 50-R drill is so fast that it was able to replace two cable tool rigs and a rotary that had been working full time at a California cement quarry. Due to the fine performance of the 50-R at this quarry, a smaller 40-R was added to the production team. Manual effort is reduced to a minimum on these Bucyrus-Erie rotaries: a remote-controlled power-driven drill pipe rack adds or removes the drill pipe. Any one of four pipes can be moved into position over the hole and screwed tight by power. The rack also stores pipe not in use.

TO CONSTRUCTION PROJECTS

On a section of the main ship canal between the Victoria and the Jacques Cartier bridges directly opposite Montreal's harbor, this 40-R is shown drilling blast holes. Material drilled at this portion of the Seaway consists mostly of black shale with bands of very hard igneous rock. The 40-R can move up or down a grade of approximately 30% with the derrick up or down. Crawler units are chain-driven from the propelling machinery. Each crawler is independently controlled by an air-operated friction clutch and band brake.

In a Hayward, there's no contact between the closing mechanism and the gravel or other materials handled. To be sure—this "no contact" feature is only one advantage. But a very important one to you—since it means much less wear, reduced upkeep, and a significant dollar-saving in bucket maintenance.

The Hayward Company, 50 Church St., New York 7, N.Y.

HAYWARD BUCKETS

CLAM SHELL • ELECTRIC • ORANGE PEEL • GRAPPLES

famous for performance since 1888

Pyrite . . .

Continued from page 37

clids to be serviced there, rather than in the field. It is also equipped with tire repair and mounting facilities.

Manufacturer's recommendations, followed to the letter, form the backbone of the firm's maintenance program. Each machine has a card index and a case history, so that maintenance costs can be balanced against production any time equipment comes up for replacement in the future.

Mine History

An interesting volume could be written on the mine and its history. In the 1860's surveyor William Magee noticed the enormous gossan capping on the mountaintop northwest of Redding. Magee and a Charles Camden bought the property for an iron mine, held it for resale until 1879, then worked in a third partner, James Sallee, who had discovered silver in an adjoining ledge.

First mining operations centered around silver production, which, during the years when silver prices were high, proved very successful. The Washoe process had been developed and was used during that time.

Sale of the Iron Mountain Mine as it was then known, to British interests took place in 1894, when the operation became The Mountain Mines, Ltd. In 1896, assets of the company passed to the present owners.

Mountain Copper pioneered the mining industry's adoption of contractor's excavating equipment to mining practice. Bulldozers were utilized immediately after being introduced on the market. LeTourneau 18-yd. bottom dump buggies were tried, as were the first 16-yd. Athey side-dump trailers. In 1929, a ¼-yd. Insley excavator and two 4-yd. solid-tire Mack dump trucks were brought in. By fall of 1930, a Bucyrus-Erie 1030-B ¾-yd. excavator had made its appearance, along with additional Mack trucks.

Successive years saw the acquisition of additional shovels. A Lima 101 was purchased—then a Bucyrus-Erie 37-B, a 54-B and finally the modern 110-B and 38-B now in use. Truck sizes were increased to 10-yd. semi-trailers, and all hauling units were equipped with large pneumatic tires. When the LeTourneau Carryall first was introduced, it stripped surface material. At that time the mine produced gold, but this operation terminated in February 1942, because of economic conditions and the threat of a labor shortage during the early months of World War II.

The massive sulfide orebodies found high in the mountains of northern California are hydrothermal replacements of a favorable layer in rhyolite flows of middle Devonian age. The ore originally formed a continuous mass some 4,500 feet long, but subsequent faulting broke this mass into numerous disconnected bodies, ranging in size from a few thousand to more than five million tons. The orebody presently being mined by open pit methods is the uppermost of these faulted bodies. In addition to massive pyrite, the primary ore contains small amounts of copper, zinc, gold and silver.

Wherever the sulfide orebodies were exposed by erosion, oxidation converted the sulfides to gossan. In places, this oxidation penetrated to depths of 150 feet below the surface. Where oxidation was complete, the copper and zinc were removed by leaching, but the gold, and to a degree the silver, underwent residual concentration to the extent that substantial portions of the gossan were worth mining as gold and silver ore.

Some portions of the sulfide orebodies adjacent to the pre-mineral feeder faults were relatively rich in copper and zinc. The so-called Old Mine orebody, containing 1¾ million tons of 7½% copper ore, was one of these. This orebody also benefited somewhat from supergene enrichment. Except for portions of the gossan rich in precious metals, the Old Mine orebody was the first in the area to be discovered and mined. Other sulfide bodies were discovered by subsequent exploration.

Copper ore was last produced during World War II when a part of one of the faulted bodies containing higher than average copper and zinc was mined and concentrated by flotation.

Personnel

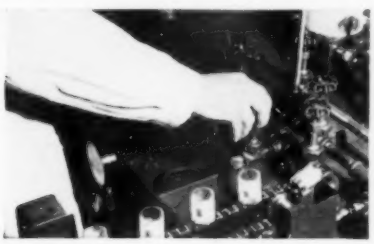
The mine currently is under the general supervision of President L. T. Kett, head of Mountain Copper Co. of California, with offices in San Francisco. Field work is under supervision of C. W. McClung, vice president and mine manager. Assisting him are R. K. Barcus, chief engineer and assistant manager; W. H. Calhoun, drilling and excavation superintendent; Don Winsor, mining engineer; Leland George, office manager; Ben Jacklin, chief electrician and master mechanic; and V. H. Dahlgren, tramway superintendent. Recently retired was A. R. Harrison, former master mechanic, who served with the company since 1919.

Mining Engineer Don Winsor (left), Chief Engineer R. K. Barcus and E. H. Dahlgren, draftsman, make plans for future excavation in an office of the firm's headquarters.

CONTINUOUS RESEARCH AT CATERPILLAR LABORATORIES IS EXTENDING ENGINE LIFE THOUSANDS OF HOURS

EXAMPLE: Lube oil filter elements that give greater protection for longer periods at less cost

The development of new, additive lubricating oils has reduced oil change requirements. Cat filters have kept pace with these improvements. Cat filters have greater *dirt-holding capacity* to filter efficiently over the entire *extended* periods. This means a big saving to every owner of Caterpillar equipment.

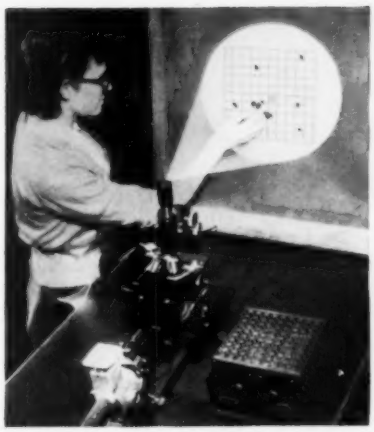


FILTER TEST STAND adds controlled amounts of dirt to lube oil to check how much dirt an element can hold before plugging. Unless this is determined, replacement recommendations cannot be made. Of all the filter makes tested, only Cat filters completely met Cat Engine requirements.

Most oil filters of other makes fall far short of meeting Cat filter replacement recommendations—usually because they have *insufficient* dirt-holding capacity (not enough filtering paper) or they filter harmless, too-fine particles which quickly load up the element, opening the safety bypass. As a result, unfiltered oil is allowed to circulate, causing rapid, premature wear.

You can't get maximum engine life unless you filter *full time*. The best way to insure long engine life, peak performance and operating economy is to standardize on Caterpillar oil filters. They are the only filters you can count on to give full-time protection over the entire filter change period that is recommended for your Caterpillar Engine. See your nearby Caterpillar Dealer today.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.



PROJECTION MICROSCOPE magnifies 500 times particles that pass through filter paper so they can be measured. Since precision bearings ride on an oil film, particles smaller than the oil film can cause no measurable wear even after thousands of operating hours. Too-fine filtering shortens filter life needlessly.

CATERPILLAR

Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

This contractor saved $1,822.24 in one year in oil changes

SERVICE TIP

Complete information on oil changes is provided in Form 32421-1, *Crankcase Lubricating Oil Change Period Recommendations*, available from your Caterpillar Dealer. These recommendations are tested and proven. When used with Cat filter elements, you'll get maximum protection for your equipment at the lowest cost.

Many Caterpillar owners tend to play it safe by changing lube oil and filter elements far more frequently than recommended; thus they are willing to gamble on lower-priced, small-capacity filter elements. This is false economy. Here is an actual experience of a contractor, owner of eight Caterpillar D8 Tractors, who followed recommended procedure with Cat filters:

Past Procedure — Oil changed every 80 hours	
Lube oil @ $1.25 per gal.	
9 gal. per change	$11.25
[redacted] filters @ $1.00 ea.	
3 per oil change	3.00
Labor cost	2.50
Total cost per change	$16.75
Ave. operating hours per year	2,400
Ave. oil changes per year	30
Total cost per machine per year	$502.50
Total cost for eight D8s	$4,020.00

Cat Recommended Procedure — Oil changed every 150 hours	
Lube oil @ $1.25 per gal.	
9 gal. per change	$11.25
Caterpillar filters @ $1.14 ea.	
3 per oil change	3.42
Labor cost	2.50
Total cost per change	$17.17
Ave. operating hours per year	2,400
Ave. oil changes per year	16
Total cost per machine per year	$274.72
Total cost for eight D8s	$2,197.76

D8s — 2U, 14A and 15A Series Tractors · Lubricating oil used: Series III · Fuel sulphur content: .4% to 1.0%

Combining boom telescope with three digging motions, this H-3 Hydrohoe cuts through brick-hard adobe to dig a water line trench at Montebello, California.

To give you a money-makin' edge . . .

Hydrohoe-Hydroshovel . . . Jack of All Digging —Master at Shaving Costs

Bucyrus-Erie Hydrohoes and Hydroshovels combine digging motions to do all kinds of excavating and cleanout work — dig manholes, valve and transformer pits, sewer and gas line trenches, to name a few. By combining motions, you spot the dipper at the best bite angle, get bigger loads faster, then move the dipper mouth way up to reduce spillage. You work fast and easy — and accurately. You save time, shave digging costs to the bare minimum. Combining boom telescope for positioning and dipper wrist action makes it easy to dig around rocks, pipe and conduit — a money-making edge for tricky jobs.

For high-speed and big-production digging, selector valve lets you concentrate *speed* where you want it when you want it — another profit-building edge for you.

Your Bucyrus-Erie distributor wants to show you *all* the money-making edges of the H-5 . . . and H-3 Hydrohoes on your digging jobs.

241H58C

Other Hydrohoe money-makin' edges

- reverse the dipper and you have a high production swing loader
- choice of standard, wide, narrow or special utilities dippers
- extra attachments carried on the Hydrohoe
- precise, smooth hydraulic control and power
- short tail swing lets traffic move while hoe works
- low-cost new or used suitable commercial truck mounting

BUCYRUS ERIE HYDROCRANE

Over 50% of Hydrocranes Sold Last Year Were Repeat Sales

BUCYRUS-ERIE COMPANY • SOUTH MILWAUKEE, WISCONSIN

New Trade Literature

Subject: **Truck Axles**

Content: The new International line of truck-built heavy-duty rear axles is reviewed in a four-page color catalog. The axles, both single reduction and two-speed, are designed specifically for handling from 50,000 pounds up to the maximum gross combination weights permitted by legal limitations for tractor-trailer highway operations in any state, and up to 30,000 pounds GVW for off-highway applications. Rated load capacities of the axle housings are 18,500 and 23,000 pounds. The new International-built axles are available in a wide range of heavy-duty International truck model series. A special catalog feature is a unique two-page cross-sectional view of the single-reduction axle. Ask for form CR-320-H.

Where to get: International Harvester Co., Department EE, 180 N. Michigan Ave., Chicago 1, Ill.

Subject: **Wire Rope Hazards**

Content: An illustrated four-page Leschen folder deals with the subject of "crushing" as a common hazard to wire rope. All of the major causes of crushing are described, including overloading, quick starts, wrong sheave sizes, as well as actual mechanical crushing. The folder provides suggestions for recognizing this source of wire rope troubles and for lessening or eliminating them altogether. Ask for Red-Strand wire rope service bulletin 102.

Where to get: Advertising Dept., Leschen Wire Rope Div., Department EE, H. K. Porter Co., Inc., 2727 Hamilton Ave., St. Louis 12, Mo.

Subject: **Off-the-Road Tires**

Content: How equipment operators and owners can get maximum service out of off-the-road tires is described in a new 52-page B. F. Goodrich handbook. Four factors, all within control of the equipment operator or owner, are discussed. They are load, inflation, operating conditions and tire care. The handbook also describes B. F. Goodrich's complete line of off-the-road tires and carries data on load and inflation; weights and measures; tire specifications for 1957 motor graders, self-propelled scrapers and tractor-drawn scrapers; plus valve and rim information.

Where to get: B. F. Goodrich Tire Co., Department EE, Akron, Ohio.

FOR 50 YEARS...
Finest in the Field!
Rely on the bucket contractors rely on. The Omaha Dragline Bucket gives full load with every cast. Perfect balance makes it easy to spot dump. Alloy steel cutting teeth stay sharp, tough and ready. Strike pay dirt now! Complete information and specifications await your letter.
DRAKE-WILLIAMS MOUNT • OMAHA, NEBR.
OMAHA
DRAGLINE BUCKETS

Subject: **HD-16 Tractor**

Content: A 14-page catalog points up features of the Allis-Chalmers HD-16 diesel crawler tractor. A large cutaway view shows both gear transmission and torque converter models. Also, a two-page spread shows matched equipment available. Specifications are included. Ask for catalog MS-1289.

Where to get: Construction Machinery Div., Department EE, Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

Subject: **Wire Rope Care**

Content: *Storage and Lubrication of Wire Rope* is the title of a new Red-Strand wire rope service bulletin. The proper procedures to follow when storing either new or used wire rope are described; also the various steps to take when the rope is put back into service. The need for proper lubrication is discussed, together with a number of methods by which lubricants may be conveniently applied. Ask for bulletin No. 103.

Where to get: Leschen Wire Rope Div., Department EE, H. K. Porter Co., Inc., 2727 Hamilton Ave., St. Louis 12, Mo.

Subject: **Conveyor Catalog**

Content: Theme of Pioneer's new 36-page catalog is "conveyors built to keep your materials moving." The catalog is compact and complete with a visual indexing system which makes it easy to use. It describes the two lines of job-engineered conveyors and pre-engineered (packaged) conveyors manufactured by Pioneer. Job-engineered conveyors are for special applications of length, capacity, horsepower or other conditions where a pre-engineered conveyor is not suitable. Special sections list accessories such as drive types, head and tail sections, supports, rock ladders, troughing and support idlers, belt take-ups and hoppers.

Where to get: Pioneer Engineering Div., Department EE, Poor & Co., 3200 Como Ave., Minneapolis 14, Minn.

TO ADVERTISE: All advertising in this section is payable in advance. Rate: $1.00 per line, or $12.00 per inch of 12 lines. Minimum charge $4.00. No discounts; no commissions. Please count your copy carefully to avoid delay. Each line contains 41 characters (34 characters if all capital letters are used). Count spaces and punctuation as one character each. Allow 10 characters for box number, if blind advertisement is desired. Be sure to enclose the correct amount of money with your order. Closing date—10th of preceding month. Example: January closes December 10th.

TO INQUIRE: Be sure to address your inquiry to the advertiser by using the correct box number. Mail your letter in care of Excavating Engineer, South Milwaukee, Wisconsin. Write each advertiser a separate letter. Do not write us for name and address of advertiser. This information will not be given out. We have no information about the equipment advertised other than that shown in the advertisements themselves.

LARGE SHOVELS, CRANES, DRAGLINES — 3 YDS. & UP

Bucyrus-Erie 120-B dragline, 100' boom with gantry mast, 4' tracks, A-1 condition, located northern California. For sale or lease.

THURMAN & WRIGHT
625 Market Street San Francisco, Calif.

1—Model 120-B Bucyrus-Erie combination shovel and dragline. Electric. Has 5 yd. and 6 yd. shovel buckets and 100' dragline boom. $80,00.
1—Model 80-D Northwest dragline, W/Murphy Diesel engine, 60' boom. $23,500.

GUY F. ATKINSON COMPANY
10 West Orange Avenue
South San Francisco, California

631 Page Electric Drag, 200', 8 yd.
9-W Bucyrus-Erie Elec. Drag, 200', 8 yd.
9-W Bucyrus-Erie Diesel Drag, 175', 13 yd.
625 Page Diesel Drag, 150', 10 yd.
723 Page Diesel Drag, 130', 10 yd.
621-S Page Diesel Drag, 125', 7 yd.
200-W Bucyrus-Erie Diesel Drag, 125' 6 yd.
7-W Bucyrus-Erie Diesel Drag, 180', 5 yd.
5-W Bucyrus-Erie Diesel Drag, 120', 6 yd.
2400 Lima Dragline, 130', 5 yd.
4500 Manitowoc Drag, 120', 5 yd.
111-M Marion Drag, 100', 4 yd.
170-B Bucyrus-Erie 6½ yd. Elec. Shovel.
150-B Bucyrus-Erie 6 yd. Elec. Shovel.
120-B Bucyrus-Erie 4 yd. Elec. Shovel.
1055 P & H 3½ yd. Standard Shovel.
80-D Northwest 2½ yd. Standard Shovel.
Unit 1020 ¾ yd. Shovel.
Smaller Shovels & Draglines available.

Model T-750 Reich Heavy Truck Mounted Rotary & Down-the-Hole Drill.

Lima Model "C" Roadpacker with Widening Attachment.

Euclid Trucks—Models 86FD, 27FD, 5FD, 2FD, 63TD, 36TD, 31TD, 25FDT, 38FDT, 67FDT.

FRANK SWABB EQUIPMENT CO., INC.
313 Hazleton Nat'l. Bank Bldg.
Hazleton, Pa. GLadstone 5-3658

SMALL SHOVELS, CRANES, DRAGLINES—UP TO 2½ YDS.

One (1) Lorain Model L-820, 2 yd. Shovel with Caterpillar D-13000 diesel engine. Shovel Serial No. 18743. Completely rebuilt at a cost of $22,000 in December of 1957. Can be bought for $25,000 F.O.B. Boston.
One (1) Northwest Model 25 with Backhoe and Shovel Front. Murphy Diesel. Serial No. 13671. Machine new in 1952. Price: $12,000 F.O.B. Boston.
One (1) P & H Model 255A Shovel and Backhoe, Serial No. 14547—new 1952. Price: $11,000 F.O.B. Boston.

For further information write or phone:
CLARK-WILCOX CO.
118 Western Ave. STadium 2-2320
Boston, Massachusetts

SMALL SHOVELS, CRANES, DRAGLINES — UP TO 2½ YDS.

SHOVEL ATTACHMENT

Bucyrus-Erie Tunnel Shovel attachment for 22-B consisting of 14' boom, 12'-10" stick, 1 cu. yd. rock dipper, crowd drum, sprocket and crowd chain. Excellent condition $2,200

SHOVELS

Bucyrus-Erie 38-B Shovel, 20'-5" dipper stick, 1¼ cu. yd. dipper, powered by International Diesel engine. Present condition $28,000
Lorain Mod. L-820, 2 yd. combination Crane, Clamshell and dragline, 50' boom, Rudomatic tagline and fairlead, 35" pads, Waukesha Diesel engine. Rebuilt and guaranteed $35,000
Bucyrus-Erie 15-B Backhoe, (½ yd.) powered by Waukesha gas engine W/elec. starter. (Shovel attachment available for $1,000) $7,000

TRUCK CRANES

Lorain Model 40 Moto-Crane, ¾ yd. capacity, with 70' boom, Rudomatic tagline, outriggers, gasoline engine, mounted on factory carrier with 11:00x20—14 ply tires front and 14:00x 20—20 ply tires rear.
Good operating condition $11,500
Lima Paymaster Truck Crane, Type E-34, ¾ yd. 35' boom, powered by 6 cylinder Buda gas engine; mounted on Brockway 6x6 truck carrier with ten 12:00x24 tires.
Reconditioned $13,000

TRACTORS

Caterpillar D4 Diesel Tractor, 60" gauge, 16" tracks, with Cat 4S straight hydraulic bulldozer and No. 46 hydraulic control.
Bonded Buy $7,500
Allis-Chalmers HD20H Diesel Tractor w/Garwood Bulldozer and DD. P.C.U.
Operating condition $10,500
Caterpillar D8 Diesel Tractor, with Hi-Output engine, Cat 8S Hydraulic Bulldozer.
Certified Buy $15,500

TRENCHER

Cleveland No. 95 Trencher, option 5, 16" buckets, 21½" cut, powered by Continental gasoline engine. Rebuilt. Good value $6,600
Subject to inspection and prior sale.

H. O. PENN MACHINERY CO. INC.
140th Street & East River CYpress 2-1800
New York, N. Y.

Lorain L-80J, 1¾ yd. Shovel, S/N 23550, with Cat. 337 engine, fluid coupling and air control. Machine in very good condition—low hours. F.O.B. cars, Denver, Colo. $32,500
Lima Model 604, 1½ yd. Shovel, S/N 324171 (1949) with 33" wide treads, powered by Cummins engine, Model HIS.
F.O.B. Casper, Wyo. $28,000
Buckeye, Model 160 Trenching machine S/N 16097, 30" buckets powered by GM Model 4-71 diesel engine. This machine has operated less than 1,000 hours. Excellent condition—can be inspected at 1300 W. Evans, Denver, Colo.
F.O.B. Denver, Colo. $18,500
Quickway Model 'L' Shovel attachment like new.
F.O.B. Denver, Colo $1,250
Lorain L-80J, 1¾ yd. Shovel attachment with Amsco Dipper. Excellent condition.
F.O.B. Denver, Colo. $3,250
Bucyrus-Erie 54-B 60' Dragline Boom with 5' inserts fairlead and counterweight.
F.O.B. Denver, Colo. $2,650

THE COLORADO BUILDER'S SUPPLY CO.,
EQUIPMENT DIVISION
1534 Blake St., Denver 2, Colo.

Bucyrus-Erie 38-B crane boom, 85', complete with mast, pendants, drum lagging and hook block—perfect condition. For details consult—

POLK EQUIPMENT CO.
490 N. Broadway Bartow, Florida

SMALL SHOVELS, CRANES, DRAGLINES — UP to 2½ YDS.

Model 820 Lorain 2 yd. crane-clam-dragline combination with Cat. No. D-13000 Diesel engine, swamp cats, 110' flange type boom, fairlead, pressure lubrication, excellent condition. Available immediately for sale or rental.
Lima Model 1201, 3 yd. crane-dragline combination, new in 1950, with Buda Diesel engine, long wide crawlers, 110' boom. Good working condition. Priced to sell.
Lima Model 604 1½ yd. crane-dragline combination, Serial No. 324167, purchased in 1951, Cummins Diesel engine, 80' boom, fairlead, overhauled last winter, very good condition. Price at job site $27,500
Bucyrus-Erie 1¼ yd. Model 33-B crane-dragline combination, 70' boom, independent boom hoist, gas power, very good condition. Ready to work.
Maxi-Mounted Bucyrus-Erie 30-B wagon crane, 35-40 ton capacity, with G.M.C. Series 4-71 Diesel engine, 50' pin-connected boom, pendant suspension, tagline reel, independent propel, 14:00x24 tires and extra brakes. Machine used 3 months—like new condition. Priced $20,000 below today's cost.
¾ yd. American crawler mounted shovel, Waukesha gas engine, working condition. Priced to sell.
Bucyrus-Erie Model 30-B 1 cu. yd. capacity crane or hoe for rent!
Bucyrus-Erie Model 11-B truck mounted 12 ton crane-hoe combination for rent!
Adnum blacktop paver, 1951 model, Serial #1958, Hercules OXC engine. Good working condition. Priced right.
Foote Kinetic asphalt mixer, type EM, Hercules 2XB, 21 h.p. engine. Never been used! Chicago location.
Bucyrus-Erie Model 22-B ¾ yd. shovel attachment, including dipper. Bargain!
Used H-3 hydrocrane, Chevrolet truck, operator's cab, boom insert, reel bucket. Good condition.
Model J Quickway shovel attachment—good condition—priced at $395.
H-3 Hydrocrane hydraulic clamshell bucket—priced at $400, Milwaukee.
½ yd. unit hoe attachment with dipper—worn but usable $500
Three 10' Bros. angle dozers—complete with pumps and cylinders. These dozers have inside mountings to fit IHC TD-18, but are easily adapted to other machines. $600 each.
Badger trencher with 3 sizes buckets. This machine can be driven to the job, as it is rubber tired. A machine for field drainage work. Priced at $2,500.
1955 Geardrolic Jeep trencher. Machine has 6' boom and extra set of frost cutters. 4083 actual miles. A buy at $2,500.
5 ton tamden auto car trucks (two available). 1000x20 tires and air brakes. Both in good working order. $1,000 each.
105 Le Roi Tractair—a self powered compressor—tractor in good shape, $1,000.
10 cu. ft. Smith concrete mixer. Has a new drum, powered by Le Roi, cable operated skip and mounted on 4 rubber tires $350

J. P. WAITE, INC.
3304 W. Pierce St. Milwaukee 1, Wis.
Phone: EVergreen 4-1900

One AC 3000 Manitowoc dragline, Serial #3200 equipped with Buda diesel engine, Serial #6U844, 90' boom, 24" shoes, 14'6" crawlers, live boom, two point sheaves, and 2-yd. clamshell bucket. This machine can be seen at Baton Rouge, La.
One Model 605 Koehring dragline, Serial #C7461, equipped with Caterpillar D13000 engine, 60' boom, 36" track shoes, 16'6" crawlers, with 1½ yd. clamshell bucket. This machine can be seen at Baton Rouge, La.
For more information contact Mr. Walt Walton

LOUISIANA MACHINERY CO.
P. O. Box 1812 Monroe, La.

SMALL SHOVELS, CRANES, DRAGLINES — UP TO 2½ YDS.

1—International truck chassis model KR-11, 149" wheel base Ca. 4-6 tons. Motor RED-450-15662 cab model HFA-58766 chassis #10334 dual tires used as sprinkler truck.
1—Dart truck model 120-BHD complete, serial #2923 Eng. #WAKH-51072—sprinkler truck.
2—Bucyrus-Erie 54-B Ward-Leonard Electric shovels serial Nos. 23191 and 46637 with 2½ yd. dippers.
1—Bucyrus-Armstrong Elec. blast hole drill, model 26 Shop #12324.
2—Bucyrus-Erie model 27-T electric blast hole drills, Shop #23446 and 79821, with 15 h.p. G.E. motors.
1—Le Roi Air Master portable air compressor, serial #206X1985, type 210D with International Harvester engine model UD14A, serial #UDE34 175-LR13.

PICKANDS MATHER & CO.
Purchasing Department 700 Sellwood Bldg.
Duluth, Minnesota

MISCELLANEOUS EQUIPMENT

Allis-Chalmers Model AD3 Motor Grader, Serial #1567, powered by GMC Model 371RC47 diesel engine, equipped with cab, 12' blade scarifier, lighting system, electric starting, 13:00x24 tires front and rear. Fair condition. $2,500
Caterpillar Model 12 Diesel Motor Grader, Serial #8T-261, equipped with cab, heater, lights, electric starting, power steering, scarifier, 14' blade, 13:00x24 tires front and rear. Excellent condition. Price on application.
Caterpillar Model D4, 60" Tractor Loader, Serial #2T-8776, equipped with new Ulrich Loader Model 1U-39, with ¾ cu. yd. bucket 78" wide, counterweight box, Caterpillar 44 Hydraulic Control, crankcase guard, electric starting. Very good condition. $6,950
Caterpillar Model D6, 74" Tractor, Serial #9U-371, equipped with 6-roller non-oscillating track frame, large front idlers, 16" wide grouser tracks, Caterpillar 46 front mounted hydraulic control Trackson Model AF6 hydraulic angle blade bulldozer, Trackson Model MD6 Pipelayer, complete with 14' boom and snatch block. Very good condition. $12,500
LeTourneau Model H3 Rock Ripper, Serial #R6502H3D, tractor drawn, cable controlled, with three shanks with detachable teeth. Very good condition. $1,200
Caterpillar Model D8 Diesel Tractor Serial #13A-2868, equipped with Caterpillar Model 8S straight blade bulldozer, Caterpillar Model 25 rear mounted double drum cable control unit, Preco Back Ripper on bulldozer, crankcase guard, roller guards, lights, electric starting, steel final drive cases, New 22" grouser tracks. Good condition. $19,500
Quickway Model "E" combination shovel and backhoe, Serial #5142-648, powered by International Gasoline Engine, mounted on International 6x6 truck. Fair condition. Price on application.
Caterpillar Model DW-10 Diesel Tractor, Serial #1V-1858, equipped with Caterpillar Model 10 scraper, Serial #3C-2105, (Scraper has been extended), Caterpillar Model 21 cable control, Serial #5C-3175, electric starting, air brakes, 12:00x20 front tires, 21:00x25 tires on drive wheels and scraper. Price on application.
Caterpillar Model DW-10 Diesel Tractor, Serial #1V-2770, equipped with Caterpillar Model 15 Scraper, Serial #4W-5257, Caterpillar Model 21 Cable Control, Serial #4W-8257, Caterpillar Model 21 Cable Control, Serial #5C-4155, electric starting, lights, air brakes, 10:00x20 front tires, 21:00x25 rear tires on tractor and scraper. Fair condition. Price on application.

R. L. HARRISON CO., INC.
1801 4th St., N. W. Albuquerque, N. M.

3—29-T Bucyrus-Erie Wire Line Blast Hole Drills.
2—42-T Bucyrus-Erie Wire Line Blast Hole Drills.
1—New RCA Metal Detector—10"x36" Aperture.
1—Fuller-Kinyon System.
1—Second-hand Drop Ball (3200#).
9—New Well Drill Bits—3¼"x4¼"—7 API Joints.
2—Pennsylvania, Class DE-2, two stage, duplex, cross compound, (direct connected), Synchronous Motor Driven Air Compressors.
Low Pressure Air Cylinder Diameter ...20"
High Pressure Air Cylinder Diameter ...12"
Stroke .....14"
1—4'x6' Kennedy Van Saun Double Deck Vibrating Screen.

NEW YORK TRAP ROCK CORP.
Old Mill Road, West Nyack, New York
Phone: NYack 7-4500

MISCELLANEOUS EQUIPMENT

TRACTORS

1—Caterpillar D8 Track-type Tractor, Serial No. 15A-840, TORQUE CONVERTER, equipped with engine guards, crankcase guard, roller guards, swinging type drawbar, No. 29 double drum cable control, 8A dozer. This tractor has been majored and all changes made. New style tracks, new crank bearings, pistons and sleeves. Excellent like new condition. Bonded buy, 90 day guarantee. F.O.B. Missoula, Montana. Contact for price.
1—D9 Caterpillar Track-type Tractor, Serial No. 18A-531, DIRECT DRIVE. This tractor is in excellent condition, equipped with overhead guard, 9A dozer, No. 29 double drum cable control, crankcase guards, front pull hook, engine guards, track roller guards. Has approximately 700 hours on the hour meter. 90 day guarantee. Bonded buy. All the changes to date have been made on this machine and it is current. Like new condition. F.O.B. Missoula, Montana. Contact for price.
1—HD-21 Allis-Chalmers Track-type tractor, approximately 2500 hours on the hour meter, equipped with an angle dozer, rear mounted double drum cable control, overhead guard, crankcase guard, track roller guards, engine guards. This machine is in very good operating condition and is being checked over and serviced in our shop at this time. Contact for price.
1—HD-19 Allis-Chalmers Track-type Tractor, equipped with a push plate. This machine was running before it was taken in on trade, but would be most likely usable best for parts.
F.O.B. Missoula, Montana $2,750
1—Caterpillar No. 933 Traxcavator Shovel, Serial No. 11A704, approximately 500 hours on the hour meter, track roller guards, crankcase guard, pull hook, one yard bucket, equipped with teeth, excellent like new condition. Bonded buy. 90 day guarantee. Price F.O.B. Missoula, Montana $8,500
1—International Harvester TD18 Tractor, Serial No. TDR9337T4, equipped with an Isaacson Hydraulic angle dozer with new edges and bits. Isaacson double drum winch, operator guard, roller guards, crankcase guard. Tracks and running gear approximately 90% good.
F.O.B. Missoula, Montana $2,750
1—International Harvester TD9 Tractor, Serial No. TDCB-30112T7BM wide gauge, with Bucyrus-Erie angle dozer and Carbo towing winch. F.O.B. Kalispell, Montana $1,500

CRAWLER TRACTOR ATTACHMENTS

1—No. 30 Cable Control for D8 tractor, Serial No. 54C-103, completely overhauled, guaranteed in new condition.
F.O.B. Missoula, Montana $1,000
1—D8D Hyster Towing Winch, Serial No. HRD-106639, equipped with automatic brake, built in drawbar, excellent operating condition, 90 day guarantee, Bonded buy.
F.O.B. Missoula, Montana $2,100

MOTOR GRADERS AND SCRAPERS

1—Caterpillar No. 80 Scraper, Serial No. 5W-561. Tires 75% good. Bowl condition good. Sheave and edges good, excellent operating condition, certified buy, 30 day guarantee.
F.O.B. Missoula, Montana $11,750
1—Caterpillar No. 70 Scraper, equipped with 16:00x24, 24 ply tires on the front, 18:00x24 20 ply tires on the rear; the tires are 40-50% good. This unit has been completely checked over, seals and bearings have been replaced where necessary. Capacity 13 cu. yd. struck, 15 cu. yd. heaped. As is.
F.O.B. Missoula, Montana $6,000
1—Caterpillar No. 12 Motor Grader, Serial No. 1M-140, equipped with single rear wheels, standard size front wheels, 10 ft. blade, cab, new cutting edges, glass replaced, seats recovered, checked over, repainted. Appears to be in good operating condition.
As is. F.O.B. Missoula, Montana $1,750
1—Allis-Chalmers Model D Maintainer, equipped with 10 ft. moldboard, scarifier, snow plow, rear mounted bucket loader, tires good, appears to be in good running condition.
As is. F.O.B. Missoula, Montana $2,500
We have two No. 12 Motor Graders being worked over in our shop at this time, and they should be priced in the near future. Contact Missoula, Montana for price.

ELECTRIC SETS AND POWER UNITS

1—Caterpillar D8800 Diesel Electric Set, Serial No. 2S857, equipped with base mounted fuel tank, hoods, and mounted on steel skids. Louis-Allis generator, 50kw, 440 volts, 62.5 kva, 3-phase, 60-cycle, self regulating. Voltage and Amperage control panel with steel doors. 110 volt take-off from transformer in control panel. Appears to be in good condition.
As is. F.O.B. Missoula, Montana ...$2,500
1—D13000 Caterpillar Power Unit, Serial No. 4S8119, outboard bearing with 22"x10½" base, cast iron flat pulley on outer bearing, and 18"x12" base, cast-iron flat pulley on inner bearing, good operating condition.
F.O.B. Kalispell, Montana. As is. $2,000
1—GMC671 Diesel Power Unit, mounted on steel base with base contained fuel tank, equipped with V-belt pulley.
As is. F.O.B. Missoula, Montana $2,000
1—GMC6110 Engine, used about 2,000 hours, 275 hp, mounted on steel and wood skids, 10 groove pulley.
Price F.O.B. Kalispell, Montana. As is. $5,000
1—Caterpillar D13000 Electric Set, Serial No. 4S5616, equipped with a G.E. 93.8 kva, 75 kw, 440 volt, 3 phase, 60 cycle, generator, reconditioned. F.O.B. Missoula, Montana. Bonded buy, 90 day guarantee $6,500

MISCELLANEOUS EQUIPMENT

SHOVELS AND CRANES

1—Lima ¾ yd. Crane, mounted on Maxi unit. F.O.B. Missoula, Montana. As is $15,500
1—22-B Bucyrus-Erie, mounted on Maxi unit, this 22-B is completely rebuilt and has an unconditional new machine guarantee, powered with a D-318 Caterpillar Diesel Engine. This machine is in excellent condition. Over-all width, 12'3", overall length, 22'8", 8 14:00x 20 tires, 6 good and 2 fair. Less front equipment. F.O.B. Missoula, Montana ...$22,500
1—44-B Bucyrus-Erie Shovel-Dragline combination machine. This machine is being serviced in our shop at this time and will be available in the near future. Contact Missoula, Montana for price.
1—Pacific 20 cu. ft. Drag Slusher Bucket, with teeth. Good general condition. As is. F.O.B. Missoula, Montana $200
1—Hough Payloader, ¾ yd. capacity, good condition, tires recapped, 30-day guarantee.
Price F.O.B. Missoula, Montana $3,500

USED COMPRESSORS AND AIR EQUIPMENT

1—Ingersoll-Rand 315 Gyro-Flo rotary air compressor, powered by GMC diesel engine, has appearance of new machine, in excellent operating condition.
Price F.O.B. Missoula, Montana $6,750
1—Gardner-Denver, Model 105 Air Compressor, mounted on 4 wheeled, rubber tired trailer, good operating condition, motor overhauled. F.O.B. Missoula, Montana $1,500
1—Gardner-Denver, Model WBQ4009 Air Compressor, 284 cu. ft. per min. 6 cyl. compressor, 6 in. low stage, 4¾ in. high stage, 5 in. stroke. Equipped for V-belt drive, good running condition.
F.O.B. Kalispell, Montana $1,250
1—Gardner-Denver Model UMB Drill Wagon, with Gardner-Denver D89D 3½" hammer, Serial No. 177635, 4 ft. power feed, chuck for 1¼" round lugshank steel.
Priced F.O.B. Missoula, Montana ...$1,200
1—Gardner-Denver 125 Air Compressor, Serial No. 190218, portable, mounted on rubber tired trailer, very good operating condition, powered with Hercules QXD-5 Engine, Serial No. 2875652. This compressor has been used about 60 days since completely overhauled.
Price F.O.B. Missoula, Montana $2,750
1—Gardner-Denver S48 Hammer, Serial No. 160-655, good operating condition.
F.O.B. Missoula, Montana $225

MISCELLANEOUS EQUIPMENT

1—American Double Drum Senior Hoist with GXD 6 cyl. Hercules engine, transmission unit, chain drive, good operating condition, appears like new.
F.O.B. Missoula, Montana $2,000
1—Yuba 2-cell Model M-8J with two 42"x42" cells, complete with baskets, grids, stainless steel screens, appears like new and in good condition. Used very little.
F.O.B. Missoula, Montana $2,000
1—Pioneer 6'x30", type A, two chain, apron feeder, with flaired side boards, appears like new, good operating condition, used very little.
F.O.B. Missoula, Montana $2,000

WESTMONT TRACTOR CO.
150 East Spruce P. O. Box 1445
Missoula, Montana

3—New, unused, 3 cu. yd. type "BU", Bucyrus-Erie lightweight dragline buckets with all fittings. Weight—5150 pounds each. Special reduced price—$2000 each. F.O.B. Evansville, Ind.

BUCYRUS-ERIE COMPANY
South Milwaukee, Wisconsin

Model 27-T blast hole drill, serial No. 18269, Waukesha gasoline power, crawler-mounted, 33' one-piece all-steel derrick complete with tools in good working order. Located in Missouri. Priced to sell. Box 3718

MISCELLANEOUS EQUIPMENT

Shovel attachment for 54-B.
Shovel attachment for 15-B.
Shovel attachment for 10-B.
Backhoe attachment for L Insley.
Backhoe attachment for K Insley.
1955 "L" Insley Hoe—gas.
1956 TD-14A W/Drott Loader.

POWER SHOVEL CO.
4913 Massachusetts Avenue
Indianapolis 18, Ind. **LIberty 7-9636**

Model 27-T blast hole drill, serial No. 19628, Waukesha gasoline power, crawler-mounted, 33' one-piece all-steel derrick complete with tools in good working order. Located in Missouri. Priced to sell. Box 3719

ONE—2¼-YD. COAL LOADING DIPPER, NEW FOR 38-B. LOCATED NEAR PITTSBURGH. $2500.
BOX 3720

For Sale: Two shovel attachments complete with 1½ cu. yd. dippers for Bucyrus-Erie Model 38-B. Used approximately 500 hours. Located in Virginia. Price f.o.b. cars each $8500.
For further information write:

BROWNING-FERRIS MACHINERY CO.
P. O. Box 7966 **Dallas, Texas**

1—Reel New Tramway Track Rope 2" diameter, Leschen Style B, flattened strand mild plow, 575' long, F.O.B. Stearns, Ky. $295
STEARNS COAL & LUMBER CO., INC.
Stearns, Kentucky

Model 42-T, International diesel powered, crawler mounted, complete with drilling and fishing tools for 9" holes. Good condition. Priced: $5000.
ALBERT MECKES
Gilbert, Pa. (near Stroudsburg, Pa.)
Phone: OVerbrook 1-2663

EQUIPMENT WANTED

I am interested in buying a Bucyrus-Erie 4 yd. electric shovel & a Bucyrus-Erie 9-W dragline.
ALEX T. McLEOD
Marietta, Kansas

When writing advertisers, please say you saw it in EXCAVATING ENGINEER

Thank you

Notes from the Manufacturers

Allis-Chalmers Mfg. Co., Milwaukee, Wis., has appointed J. D. Morris as sales manager of its new utility tractor and equipment sales department. Utility products will be sold through dealers in the Construction Machinery, Engine-Material Handling and Farm Equipment divisions of the company. In addition to products manufactured and sold by Allis-Chalmers, the company has set up a program of engineering clearance under which selected applicable companion products of outside manufacturers will provide a complete line of equipment for utility applications. Morris has been a factory sales representative since 1954.

Atlas Powder Co., Wilmington, Del., has dedicated its new technical center in suburban Wilmington. The $3 million facility, located next to the company's general office, will house Atlas' basic research and chemical product development activities.

General Tire & Rubber Co., Akron, Ohio, has dedicated its new $1 million giant tire retread plant in East Rutherford, N. J. Of the plant's 85,000 square feet, 65,000 square feet are devoted to the storage and central distribution of all sizes of tires to supply the needs of dealers in New Jersey, New York, Connecticut and Pennsylvania. The remaining footage —20,000 square feet—is devoted to the Kraft process of recapping tires. The East Rutherford operation is the major eastern link in a network of giant tire retread plants built or expanded recently by General Tire to service the needs of road contractors under the federal-aid highway program. Other plants in the network are located at Charlotte, N. C.; Akron, Ohio; Kansas City, Kan.; Corpus Christi, Tex.; Boise, Idaho; and Los Angeles, Calif.

LeTourneau-Westinghouse Co., Peoria, Ill., has named Louis A. DePolis vice president in charge of marketing. DePolis came to LeT-WesCo from the Industrial Truck Div., Clark Equipment Co., where he had served as director of sales since 1953. DePolis will direct the LeT-WesCo sales organization and supervise and coordinate all marketing activities, including sales promotion, advertising, equipment service and field engineering.

McKiernan-Terry Corp., Dover, N. J., has named William H. Guest midwest sales manager for its pile hammer division. He will be in charge of distributors and dealers in midwestern states and part of Canada. Headquarters of the district are located at 7 S. Dearborn St., Chicago, Ill.

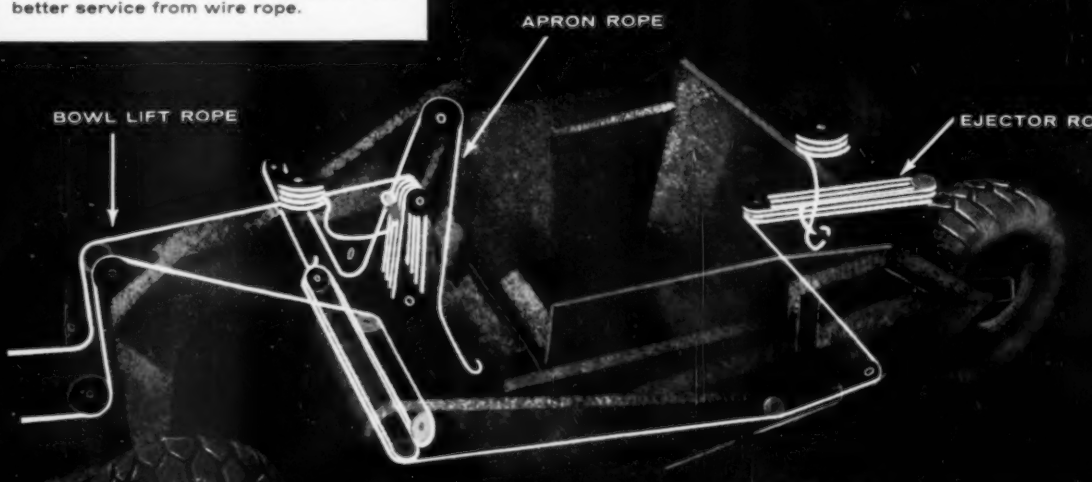
Marion Power Shovel Co., Marion, Ohio, has appointed four new sales representatives in various sections of the United States and Canada. Jack W. Forgy, 1016 Baltimore Ave., Kansas City, Mo., covers the states of Colorado, Wyoming, Nebraska, Kansas, western Missouri and western Iowa. E. R. Johnsen, 1017 N. 22nd, Phoenix, Ariz., has been assigned to Marion's western sales district. His territory includes the states of Arizona and Utah, and parts of Idaho, Nevada, Wyoming and New Mexico. Joseph E. Fodor, 420 Lexington Ave., New York, N. Y., is representative in western Pennsylvania and western New York state. Peter F. Jarvis, Crescent, Ont., is district manager for eastern Canada, covering the Maritime Provinces and the provinces of Ontario and Quebec.

Marlow Pumps Div., Bell & Gossett Co., Midland Park, N. J., has named S. R. Schleicher general manager of the division. Schleicher joined Marlow in 1950 on a special engineering project and later became production manager. He will retain this position in addition to his new duties. Marlow specializes in self-priming centrifugal pumps.

Oshkosh Motor Truck, Inc., Oshkosh, Wis., has elected Clinton E. Sartwell vice president and director of engineering. Sartwell has been chief engineer for Oshkosh since 1934. Before joining the firm, Sartwell had been with Sterling Motor Truck, West Allis, Wis.

ONE OF A SERIES of advertisements to help the construction industry get better service from wire rope.

CARRY TYPE SCRAPER



BOWL LIFT ROPE
6 x 25F PREformed Regular Lay Whyte Strand IWRC
6 x 25F PREformed Lang Lay Whyte Strand IWRC

APRON ROPE
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Macwhyte Scraper Ropes
can lower your yearly rope costs!

Scraper service needs the best wire rope — and the right rope will cut costs.

For carry-type scrapers, Monarch Whyte Strand 6 x 25F IWRC is the *correct* rope. It is specifically designed for the severest service wire rope can get. The outside wires are big and tough. They provide plenty of surface for abrasion-resistance. The independent wire rope core gives extra crush resistance, while the 199-wire PREformed make-up assures a flexibility that matches the rugged demands of constant heavy service.

The thorough Internal Lubrication of Whyte Strand Wire Rope is a further help in extending service life under severe service. Check these features. They mean longer life — and that means less rope for you to buy!

For helpful information about Wire Rope and its correct use on contractors' equipment, write for your free copy of Bulletin 5702. It's loaded with helpful cost-saving information. 108

INDUSTRIAL • AIRCRAFT • MINING • LOGGING • ELEVATOR • MARINE • CONSTRUCTION • DRILLING

MACWHYTE *Wire Rope* COMPANY

MACWHYTE WIRE ROPE COMPANY
2903 Fourteenth Avenue, Kenosha, Wisconsin
Manufacturers of Internally Lubricated PREformed Wire Rope, Braided Wire Rope Slings, Aircraft Cables and Assemblies, Monel Metal, Stainless Steel, Plastic Coated and Nylon Coated Wire Rope, and Wire Rope Assemblies. Special catalogs available.

MILL DEPOTS: **New York 4,** 35 Water St. • **Pittsburgh 36,** P. O. Box 10916, 353 Curry Hollow Road • **Detroit 3,** 75 Oakman Blvd. • **Chicago 6,** 228 S. Desplaines St. • **St. Paul 14,** 2356 Hampden Ave. • **Ft. Worth 1,** P. O. Box 605 • **Portland 9,** 1603 N. W. 14th Ave. **Seattle 4,** 87 Holgate St. • **San Francisco 7,** 188 King St. • **Los Angeles 21,** 2035 Sacramento St.

There's a Macwhyte Distributor near for Quick Service

THE TAKE-CHARGE D9

—built big and tough for the big, tough jobs

- 320 HP at flywheel.
- 30-ton weight.
- Exclusive Caterpillar oil clutch — plates cooled and lubricated with oil, rarely need adjustment.
- Optional heavy-duty torque converter transmission.
- Heavy-duty steering clutches with finger-tip steering. Power-boosted controls.
- Extra-rugged frame and final drive.
- Massive 7-roller track frame.

These are just the bare facts. No words and pictures can begin to describe the Caterpillar D9 Tractor. Engineered and built to take charge of any job, it's big, tough — and economical in the long run. See what it'll do on *your* job. Have your Caterpillar Dealer put it through its paces. That's all it asks.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR

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FIND YOUR CATERPILLAR DEALER IN THE YELLOW PAGES

KING OF THE CRAWLERS